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MATS LOOKS AT THE CUBAN CRISIS...TERMINOLOGY CONTROL AND NATIONAL STRATEGY...WE CAN WIN A NUCLEAR WAR

SEPTEMBER-OCTOBER 1963

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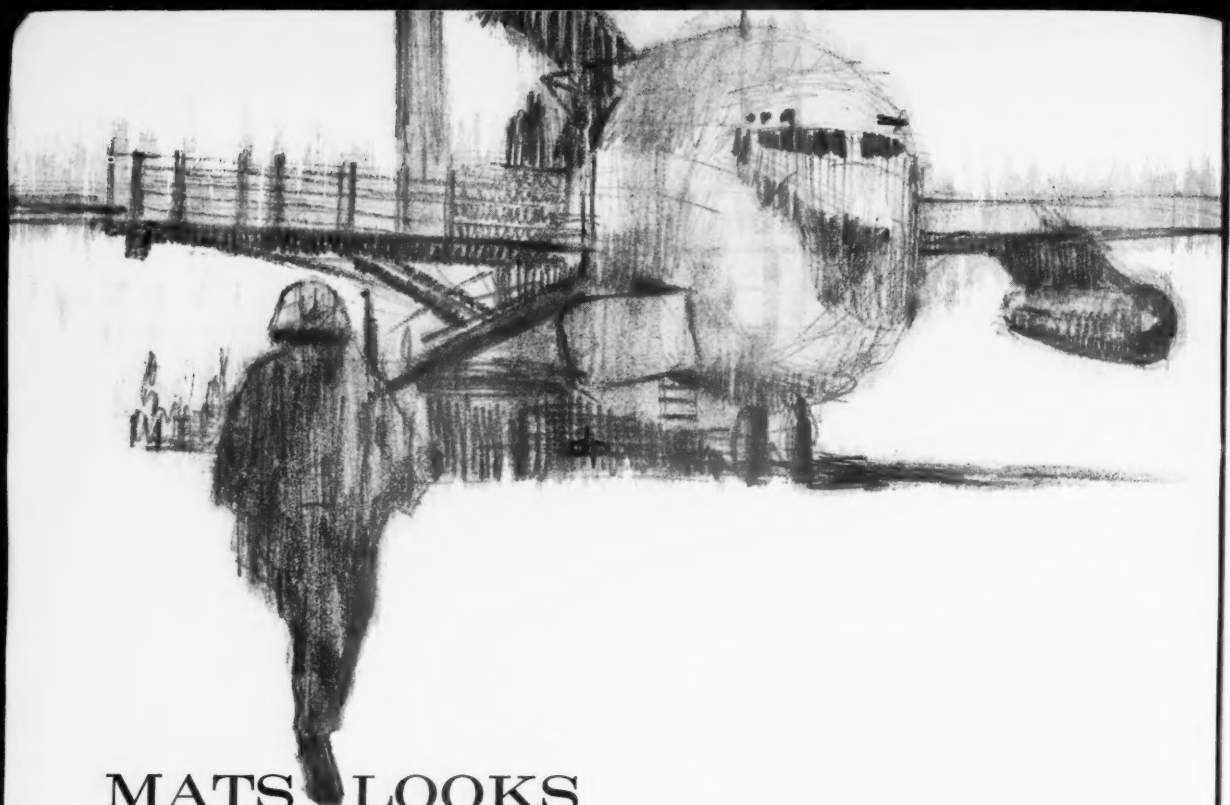
the cover

General Joe W. Kelly, Commander, Military Air Transport Service (MATS), is featured on the cover of this first issue of the bimonthly *Air University Review*. In our lead article General Kelly describes the tight schedule under which MATS operated during the Cuban crisis of October-November 1962.



MATS LOOKS AT THE CUBAN CRISIS

GENERAL JOE W. KELLY

ON 22 October 1962 President John F. Kennedy alerted the Nation and the world that the Soviet Union had established nuclear missile forces in Cuba. Reporting to the American public that Monday evening last fall, President Kennedy called the secret and unprecedented Soviet introduction of offensive weapons into Cuba a threat to the security of the United States and the entire Western Hemisphere.

The Commander in Chief termed the buildup of Communist arms on the island nation 90 miles southeast of the U.S. mainland a major effort by the Soviets to change the strategic balance of world power. Inaction to counter this activity would invite the Soviets to make similar moves elsewhere and to demand concessions detrimental to the interest of the United States in other parts of the world. Unless the Soviet Union stopped its military buildup in Cuba, Mr. Kennedy warned, the American Government, which had already placed its military forces on standby alert, would be prepared for any eventuality. As a first step, he announced, the U.S. would impose a weapons quarantine around Cuba.

Even as the President addressed the American public, the military forces of the United States were on the move in what was perhaps the swiftest, most competent single deployment in the Nation's history. The detailed story of Air Force operations alone in the Cuban crisis is one of massive, complex actions accomplished with the high speed and efficiency of professional airmen. It is the history of those actions—and the resultant lessons reiterating

the basic principles of air power and its application—that will help guide future actions in future crises.

The Cuban experience, a joint armed forces operation that never had to be completed, involved more than 400,000 men, more than 200 warships, thousands of aircraft from all the services, and a massive tonnage of military materiel. If a military force had been launched to the Cuban mainland, it would have been an operation comparable in scope with some of the largest of World War II.

Although imposition of a weapons quarantine of Cuba presented a new equation in the Caribbean problem, possible contingency plans for U.S. operations in that area had been prepared much earlier. Like the scores of other contingency plans that the Joint Chiefs of Staff require for possible major military actions in any part of the world, the Caribbean area plans were maintained under constant review to keep them current.

In the event such plans had to be carried out, the mission of the Military Air Transport Service (MATS) would have been immediate long-range airlift of materiel and personnel to supply and reinforce existing installations, airlift of airborne troops, air evacuation of casualties, backup support of possible Strategic Air Command nuclear strike activities, and provision of air weather, air rescue, and documentary photographic services to participating forces. Although the MATS airlift force has an inventory of 44 Boeing C-135 Stratolifter all-jet cargo transports, a force of 45 Douglas C-133 Cargomaster turboprops, and a growing number of Lockheed C-130E Hercules long-range turboprop transports, the majority of its airlift forces on hand during the fall of 1962 consisted of 279 piston-engined Douglas C-124 Globemasters, 102 Douglas C-118 Liftmasters, and 56 Lockheed C-121 Constellations. Every airframe of the last three types was physically at least eight years old, with dates of basic design closer to World War II than to the present.

As planned, requests for MATS airlift missions for Cuban contingency operations were funneled by all forces into the unified command headquarters of the Commander in Chief Atlantic (CINCLANT)* at Norfolk, Virginia. CINCLANT then tasked MATS with the specific and immediate requirements of the services concerned. The system allowed MATS, as the single service agency responsible for airlift to the Secretary of the Air Force and Department of Defense, to maintain sustained operational control of its sizable military and civilian airlift resources. This control ensured the most efficient use of available airlift not only to meet the commitments for Cuba but to fulfill the scores of continuing requirements for normal day-to-day airlift conducted on a global scale.

As the Cuban crisis approached, MATS was ready. The command's operational psychology, based on firm training requirements, is uncomplicated. Personnel know they have a job to do. They know how to do it. They work with spirit to get it done, and when it is finished they are ready for more. Responding from a D-day posture of readiness, MATS aircraft virtually flew the world in support of requirements for the U.S. Cuban contingency operations and concurrent missions of U.S. interest.

Although the President made U.S. intentions to act against the Russian missile threat public to the world on 22 October, U.S. forces had been ordered to begin active preparations for contingency operations eight days earlier. Initially MATS would be required to airlift thousands of men and hundreds of tons of battle supplies needed to bring contingency forces into position and prepared to airlift airborne troops to battle and return to the U.S. with casualties.

However, the scope of MATS operations is not limited to contingency operations alone. The myriad of MATS responsibilities inherent in support action for scores of U.S. global commitments makes it difficult to isolate the specific activities of any one operation from the over-all requirements for airlift and technical services within the entire MATS mission. In total, MATS must be capable of performing detailed hard-core global airlift requirements for general and limited war, performing airlift for

*Forces under CINCLANT were elements of the U.S. Navy and elements of the combined Strike Command formed just a year previously as a part of the defense reorganization action of 1958. Army units included combat divisions with backup forces of two Army corps, the III and XVIII Airborne Corps. The Air Force element, known as AFLANT, was from the Tactical Air Command with its varied capabilities of strike, reconnaissance, and assault airlift.

Loading Marine equipment onto C-124

MATS/Marine Airlift— California to Cuba

MATS' airlift for the Marine Corps began shortly after dusk on 21 October 1962. In this operation Marines and their battle equipment were flown from California to Guantanamo Bay, Cuba. Within 48 hours of the first take-off the last of the C-124's and C-135's had reached the Guantanamo Naval Air Station.

Preflight testing of walkie-talkie

Briefing before the flight to Cuba

Battle-ready Marines boarding C-135 Stratolifter, California

Unloading on the double at the Naval Air Station, Guantanamo Bay

Assembly . . .

a variety of contingency operations in support of national policy, and acting as the agency that either moves or supervises the moving of air logistics to all forces deploying overseas.

From a MATS point of view the time span of the Cuban emergency extended through a six-week period from the first of October through the second week of November.

October began as a busy month with the anticipation that the full capabilities of the MATS airlift force would be exercised. Planning was worked out on the basis of special assignment airlifts anticipated as the result of known increases over the preceding year, the normal levy of new requirements, plus recurring requirements already programed. Recurring requirements included the Army Rotoplan —rotation of combat troops to Europe and return; Long Thrust V—airlifts of Army forces to Europe in support of the North Atlantic Treaty Organization; troop rotations to and from the Congo of Swedish and Irish infantrymen committed to the United Nations peace force; and Exercise Southern Express in which Europe-based U.S. troops were flown to NATO maneuvers in Greece. Other major requirements included Three Pairs—an Air Force–Army maneuver in the U.S.; Operation Deep Freeze—support of the U.S. Navy scientific expedition at the South Pole; JTF-8—airlift support for U.S. nuclear tests in the Pacific; and finally the scheduled joint airborne training program with the Army.

All these requirements could be met, through careful allocation of forces, using normal crew duty hours and a normal over-all daily aircraft utilization rate. With the additional requirements levied by the Cuban contingency, the utilization rate was upped to more than five hours and crew time was greatly extended. Concurrently with the alert of CINCLANT forces on 16 October, MATS surged to a wartime activity rate. Specific actions included increasing authorized flying hours for each crew, placing support activities on a 24-hour day, spotting for duty the maximum number of aircraft in an operational status, waiving or limiting aircraft operational restrictions and periodic inspection requirements that did not affect the safety of flight, imposing an even closer watch over aircraft utilization, and shifting to commercial carriers all the missions they could handle that were not hard-core military operational requirements.

As commitments for airlift grew, waivers of MATS Airlift Operations Manual 55-1 were granted to the Transport Air Forces to keep aircraft flying at maximum rates. These waivers were authorized only for aircrews on specific Joint Chiefs of Staff-directed contingency missions and to accomplish C-124 formation flying training. They did not apply to the routine channel traffic requirements that MATS continued to honor in fulfilling its global airlift commitments.

The specific flying waivers included (1) 24-hour crew duty time authorized for limited crews—the normal is 18 hours; (2) 30-hour crew duty time authorized for C-133 global augmented crews—normal is 27 hours; (3) wartime take-off gross weights of 194,500 pounds authorized for C-124C, and 180,000 pounds for the C-124A, provided 100-foot-per-minute three-engine climb performance was attainable—the C-124C normally is authorized 185,000 pounds and the C-124A 175,000 pounds; (4) 125 troops authorized to be carried in the C-135—peacetime load is 84, including crew; and (5) crews authorized to fly 150 hours per month and 350 hours per quarter—normal flying per month is 125 hours and 330 hours per quarter. Various one-time waivers also were granted C-118's for over-gross landings.

Although Air Force headquarters extended authority to fly officers in the code 3 and 4 flight-status category, it was decided that these personnel would not be used unless the crew status became truly critical. A critical requirement for these officers to fly did not materialize, and they were not utilized.

The various flying waivers were in effect only 10 to 15 days. By the end of October, when the crescendo of preparation for the Cuban crisis had modulated, the waivers were voided and all requirements of the MATS Airlift Operations Manual reinstated.

ON 17 October MATS launched its

Army paratroopers line up to board a MATS C-124 for jump exercises at Fort Campbell, Kentucky, as MATS develops the capability of airdropping troops and battle equipment from formation.

aircraft in the first major effort in response to the Cuban requirement. It was a series of 54 missions to airlift essential battle equipment, conventional ammunition, and supplies to the growing air armada in Florida.

The speed of the initial ammunition and supply airlift was made possible by the modern communication and accounting system of the Air Force Logistics Command, which within hours was able to furnish information on the exact amount, type, and location of vital materiel positioned throughout the world.

AFLC also kept a close eye on MATS supply requirements. Requests for aircraft parts, tires, and such gear were carefully monitored to be sure the equipment was available when and where needed. Consequently, AOCP (aircraft out of commission for parts) rates reached no alarming peaks in spite of the intense activity.

On 19 October, three days before President Kennedy's statement to the nation announcing the weapons quarantine of Cuba, MATS was alerted for a series of Marine Corps airlifts. They included airlift of Marines to Guantanamo Bay.

The movement had top priority from the Joint Chiefs of Staff and, incidentally, made history as the first major MATS airlift performed for the Marine Corps. (This action was one of a series of airlifts that would pave the way five months later for MATS designation by the Air Force Chief of Staff as the single point of contact for providing air transportability training to the Fleet Marine Forces.)

As aircraft deployed to the West Coast to pick up the Marines and their combat equipment, Federal Aviation Agency aircraft control points on both sides of the continent were alerted to the probable flow of aircraft. Altitudes were blocked in the Los Angeles area to give the aircraft a 500-foot separation and 10-minute landing interval to expedite aircraft movement. Loading problems were worked out on the spot as MATS loadmasters met with

Air Photographic and Charting Service personnel check the switch wiring of a DBM-4A 16-mm camera mounted under the center bomb shackle of a TAC F-100 Supersabre. The forward- and rear-looking cameras took excellent action shots during the Cuban operation.

their Marine counterparts on the flight line. The first aircraft got off shortly after dusk. Although loading problems slowed the schedule as much as 9 hours at one point, the lift of Marines, battle-garbed with rifles and bayonets, was completed within 48 hours. The airlift was carried out with such dispatch that a report by telephone to the Joint Chiefs of Staff announced "Mission completed" before a new commitment had been decided upon.

The priority missions continued to flow in from the Joint Chiefs of Staff. To minimize delays in mission schedules and loading, MATS advised all users to be as exact as possible in submitting airlift requirements, taking into consideration cubic-foot displacement as well as gross weight.

The earlier requirement for the move of ammunition from Charleston to Guantanamo reflected the urgency of the Cuban situation. As the MATS command and control system converged a force of C-118's, C-121's, and C-135's to airlift materiel to Guantanamo, the Navy was readying dependents for evacuation from the base for return to the U.S. mainland. Three hundred ninety of the Guantanamo dependents were sent to Norfolk on Navy aircraft, and approximately 2800 were loaded aboard

four Navy ships for arrival at that same port on 25 October. As dependents were moved out and Marine reinforcements were airlifted in, Guantanamo Naval Air Station strength doubled.

On 23 October MATS suffered its only casualties of the operation. A C-135 loaded with ammunition was lost, killing all seven crew members, when it crashed at Guantanamo while making a landing approach. This was the only MATS accident attributable to the Cuban emergency in more than 118,000 hours of flying over the two-month period. In addition, the Air Force lost nine other flying personnel during the Cuban emergency. They included RB-47 reconnaissance crews in crashes at MacDill and Kindley AFB and U-2 pilot Major Rudolf Anderson, Jr., shot down by antiaircraft fire on a high-altitude photo-reconnaissance mission over Cuba.

Concurrently with airlift support operations, MATS, between 24 October and 2 November, exercised with Army elements of the Strike Command to airdrop 42 tons of equipment and 1600 paratroopers in support of airborne training requirements. The aircraft chosen for paratroop airdrop operations was the C-124. Previous experience in using the aircraft for this purpose had been acquired just the month before, when MATS aircrews had for the first time made a formation drop of 2100 paratroopers at Fort Campbell, Kentucky.

A number of the C-124's, scheduled to receive special drop equipment later in the year, were yet deficient in certain gear. MATS had no alternative but to institute a fast self-help program to ready the drop aircraft. This was done in a three-week period on a number-one-priority basis. To get the program going at top speed, MATS officers met with representatives of the Air Force Logistics Command and Warner Robins Air Materiel Area at Donaldson Air Force Base to expedite fabrication of cargo and personnel drop equipment. The only solution possible in the truncated time span was fabrication of the gear from MATS resources. Headquarters of MATS Transport Air Forces, EASTAF at McGuire AFB, New Jersey, and WESTAF at Travis AFB, California, were directed to attain cargo and personnel drop capability through use of their own materiel and manpower. Examination of resources, materiel, and facilities dictated that this task could be most effectively accomplished at Donaldson AFB. Mass production methods were used to meet the stringent deadlines for completion of the project. Work was to continue round the clock until completed. As backup, the Air Force Logistics Command alerted materiel depots that MATS had authority of Project Full Speed in order to achieve drop capability for all its C-124 aircraft. The aircraft equipment deficit was made up within twenty days.

On 23 October Air Force headquarters advised MATS that upon completion of the JCS priority missions, formation training would be resumed on a priority basis over all other requirements. Accordingly, the C-124 crews were briefed to return to home stations for formation training upon completion of existing JCS-directed moves.

The formation training program was resumed in full on 26 October, and by 30 October the task was completed.

Army forces moving to the southeastern United States included infantry, armored, airborne, and logistical troops. As a part of this move, MATS airlifted an Army artillery group from El Paso, Texas, to Homestead AFB, Florida. The mission took 19 aircraft to lift 169 troops and 486 tons of cargo in just two days.

The rapid deployment of preassigned elements of the Army, Navy, and Air Force that made up the CINCLANT forces demonstrated the ability and speed of U.S. forces to meet requirements of the Joint Chiefs of Staff to form promptly for the type of military operation needed to meet specific situations. Command realignment was not always necessary. In our case, the MATS command was simply ordered to provide whatever contingency airlift CINCLANT called for. Priorities for such service were established through the Joint Chiefs of Staff to CINCLANT.

The command and control function for MATS forces during the crisis was handled exclusively from the Headquarters Command

Post at Scott Air Force Base for the first 13 days of alert following the alert of CINCLANT elements. Requirements for airlift were received by MATS from CINCLANT and forwarded to the Transport Air Force headquarters command posts at McGuire and Travis Air Force Bases. As activity heightened, the MATS Cuban emergency Command Post Group at Scott AFB was activated 22 October, and as the buildup assumed its final giant proportions a MATS headquarters ADVON, under command of the MATS Deputy Chief of Staff for Operations, Major General George Dany, was established on 29 October with AFLANT headquarters at Langley AFB, Virginia. If operations against Cuba had been undertaken, the MATS advanced echelon headquarters would have monitored activities of MATS aircraft committed to the action, backed up by the Command Post at Scott AFB and the global command and control system. The Langley AFB ADVON was discontinued on 10 November, and a new MATS ADVON was created at Homestead AFB to work directly with the unified command post activated there by the Air Force three weeks earlier.

As a part of its responsibilities in support of contingencies, MATS has long maintained the versatility to support military actions, large or small, at any point on the globe. This includes the formation of cellular-type units for control and support of selective airlift operations whenever and wherever required. These preidentified airlift units are able to operate independently in any given situation and give the command a fast and effective reaction capability. During the Cuban operation a support squadron, provisional, was established at Pope AFB, North Carolina, and a second at Campbell AAF, Kentucky, and 16 MATS control teams were located at various other bases.

In all, 4310 MATS personnel were committed to deploy in support of MATS emergency requirements, including 367 personnel provided to Tactical Air Command forces for various augmentation tasks. Throughout the emergency period MATS maintained a permanent liaison officer with AFLANT headquarters and assigned a number of other officers as special advisers to AFLANT operations. As the Cuban tension eased following exchange of messages by the President and Premier Khrushchev on 27 October, only 1633 MATS personnel were actually deployed. This figure does not include, naturally, the thousands of aircrew personnel whose primary duty is flying.

Deployment of the first contingent of MATS personnel was ordered 21 October when Headquarters USAF requested that three air transportation supervisors and ten air freight specialists report to Homestead AFB in support of Tactical Air Command requirements. The men arrived on station at 2230 hours that same day.

In order to provide the forces and services required for the Cuban contingency from its internal inventory and at the same time keep its normal facilities operational, MATS had to realign military and civilian duty hours. One of the first actions was to authorize the Transport Air Forces to exceed the normal command one per cent overtime limitation for civilians, as needed, to support the contingency operation.

It is estimated that some 15 per cent of all Air Force personnel are attending service schools at any one time. MATS is no exception. When the Cuban crisis occurred, some 118 officers were on TDY at Squadron Officer School. Authority to return them to their units immediately was given by Air Force headquarters on 24 October. This move netted the command an extra 111 personnel. In consideration of the time and money spent on these men, full credit for completion of the course was authorized and set in their records.

The need for personnel, tight throughout the entire Air Force, was reflected on 26 October when USAF authorized major commands to withdraw or withhold officers and airmen from TDY to USAF service schools. The order emphasized that only those personnel considered essential to meet current readiness requirements should be withdrawn. Twenty-eight MATS officers and airmen were withheld.

Although requirements for the Cuban emergency were receiving the major portion of MATS' attention, it was imperative to protect command ability to implement simultaneously

other contingency plans by maintaining a crew and airframe posture in the U.S. equal to requirements for such plans. The Transport Air Forces were instructed to maintain such a posture, and plans were made to recall offshore aircraft and crews to meet this requirement.

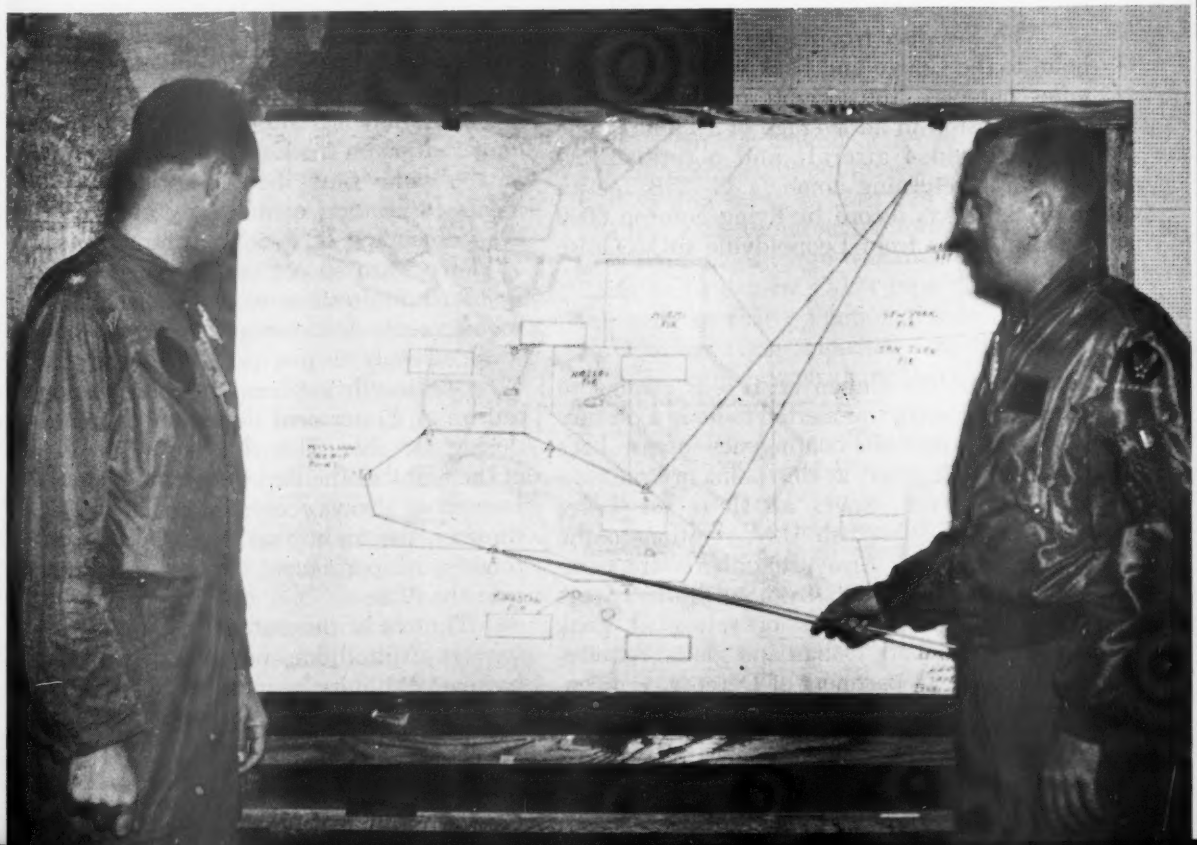
AIRLIFT operations for contingency forces during the Cuban crisis cannot be viewed alone. Throughout the period of tension MATS was committed to hundreds of other flights as a part of its continuing mission of supplying the Department of Defense with global airlift capability. These missions came in all sizes.

Project Ida. On the first of October, Douglas C-124 Globemasters and C-133 Cargomasters were already engaged in airlift of relief supplies and equipment—U.S. Army tents and medical supplies—from U.S. bases in Europe to Iran following the worst earthquake in that nation's history. The lift comprised 443.8 tons of medical material delivered in 17 flights over a 3300-mile route.

Long Thrust V. A quarterly scheduled troop airlift exercise beginning 1 October for the Army, designed to demonstrate mobile support to NATO by American troops stationed in the United States. MATS accomplished this exercise over a period of 18 days, using reciprocating-engine aircraft. More than 17.3 tons of equipment and 1362 troops were airlifted to Europe in 25 missions. On the return trip, in 26 missions, 1133 troops and 38.9 tons of cargo were brought back from Germany.

Southern Express. MATS aircraft already in Europe for Long Thrust V requirements were used to airlift 470 tons and 3000 troops for NATO from Europe to Greece in 127 mis-

A 53d Weather Reconnaissance Squadron navigational briefing. Operation of the Air Weather Service flew WB-50's on 3350-mile flights twice daily from Kindley AFB, Bermuda, around Cuba. A minimum distance of 40 miles was maintained. Weather readings were taken every 20 minutes while circling the island and radioed in for interpretation.



sions. When the assignments were completed, the aircraft returned to Germany for the Long Thrust flight back to the U.S.

Rapid Roads. This operation involved the airlift of U.S. troops within the United States. Both the new Boeing C-135 jets and MATS piston-engine transports were used during the first nine days of October to fly a total of 308 missions, transporting 12,000 troops and 2000 tons of cargo.

Congo. From the 10th of October through the 16th of October, a C-135 Stratolifter airlift moved 1232 Swedish troops and 16.6 tons of cargo for the United Nations into the Congo. It was the first all-jet airlift into the Congo by MATS aircraft, which have been providing airlift support to the United Nations' effort since July 1960.

Although the original Congo operation by MATS was performed for 16 months by an airlift task force operating from Chateauroux AB, France, today MATS Congo airlift missions are flown on a special assignment basis from the continental United States. Ninety per cent of all cargo and 79 per cent of personnel airlifted for the United Nations' Congo effort have been flown by MATS.

The Swedish troop rotation from Stockholm to the Congo and back was 4900 statute miles one-way, the aircraft making the distance nonstop in an average of 10 hours. The lift required 4 aircraft and a total of 19 missions. Returning home, a C-135B set an unofficial MATS record by flying nonstop 6000 nautical miles from Leopoldville to McGuire in 13 hours.

MEANWHILE the Cuban crisis was coming to a head, and MATS was alerted to be in a posture to execute possible contingency plans. Let's see where we stood at this point in time.

Worldwide, MATS missions for Long Thrust V, the Swedish U.N. rotation to the Congo, and U.S. Army Rotoplan were completed by 22 October. By now the full MATS global airlift force was operating at peak capability for both Cuban and global requirements of the Department of Defense. Conventional and routine requirements levied by MATS users were not ignored nor unduly delayed during this period. Although much of the MATS active airlift force was withdrawn from the normal airlift requirements around the globe, depot levels of priority freight did not get out of hand nor were rotational passengers delayed. However, to ensure that only priority items were airlifted by the military force, MATS users were notified to divert all outsize cargo to other transportation whenever possible for an indefinite period.

By 23 October the MATS airlift capability was saturated with Department of Defense requirements, and clearance was given to move all passengers and cargo possible by commercial airlines. Normally, MATS airlifts about 55 per cent of DOD routine channel traffic on commercial carriers. And it should be noted that from fiscal 1961 to fiscal 1962, in line with its long-range policy of utilizing contract commercial airframes to the greatest extent possible, MATS increased its use of commercial airline facilities by 15 per cent for passenger travel and 25 per cent for cargo lift. Thus during September 1962 a total of 69 per cent of all DOD passenger channel traffic was carried by contracted commercial facilities, and 42 per cent of the cargo requirements were flown by commercial means. The necessity of keeping cargo flowing through the aerial ports of embarkation on the East and West Coasts and at the same time meeting priority commitments for Cuban contingency airlift boosted the percentage of civilian contract cargo by 14 per cent to 56 per cent during October.

It is interesting to note that passenger requirements for commercial airlift actually dropped only 4 per cent during the crisis. MATS ordinarily expects, and had programed, a drop of 25 per cent in passenger movement during October. This dip is routine in view of the fact that the largest volume of passenger movement always occurs in the late spring and summer, the traditional time of year for troop rotation on permanent change of station outside the U.S.

The use of percentages of cargo and passengers airlifted does not give the full picture, however. Military requirements for airlift are

specific, immediate, and, at times as the result of sudden new needs, erratic. A great deal of flexibility is required for an operation that for 12 hours might require very few aircraft but that in a matter of minutes could receive levies for peak capacity during the next 12 hours. The result is a series of peaks and valleys of activity which, despite preplanning, occur in military requirements.

Such a condition occurred in the commercial airline picture during the third week of October. Although the commercial airlines had the capability to transport passengers and cargo if given the lead time to plan such flights, DOD requirements, particularly for cargo, were sometimes so urgent that the commercial airlines could not always meet demands at exactly the time and place required and still keep their own commercial schedules.

Meantime actions were under way to increase the operational readiness of MATS Air National Guard and Reserve units. In addition two Guard units recently released from active duty with MATS following the Berlin crisis call-up (the 133d Air Transport Wing, Minneapolis, Minnesota, and the 146 ATW, Van Nuys, California) volunteered for missions. The offer was accepted, and their Boeing C-97 piston-engine aircraft were given 29 missions to Greenland and South America hauling 266 tons of cargo.

India. Even as the immediate press of the Cuban crisis slacked off, MATS global airlift requirements continued to flow in. On 2 November, C-135 crews from McGuire and Travis were given a special airlift assignment to Europe to pick up arms for India. Flying the equipment obtained both from arsenals in the United States and from American installations in Western Europe, the Boeing jets delivered 941 tons of battle gear to Dum Dum Airport, Calcutta, in 45 missions over a two-week period. The situation provided an ideal demonstration of the capability of the big jets. The aircraft, which had been showing an average daily utilization rate of almost 5 hours per airframe, revealed qualities of quick reaction and versatility for use in almost any contingency. Average round trip for the aircraft was 12,000 statute miles.

La Paz, Bolivia. The arms lift to India did not represent the last of the extraordinary missions within the time span of the Cuban crisis. On 5 November a rush airlift of 134 tons of communications and electrical gear was required for La Paz, Bolivia. What appeared as a routine "milk run" to assist a South American neighbor posed some interesting airlift problems. The airfield at La Paz is situated at 13,300 feet altitude and at the time of the airlift requirement was liberally strewn with a cover of coarse stones. Although MATS giant C-133 aircraft, with their capacity to carry more than 30 tons per load, would have been the preferred aircraft for such an immediate lift, MATS controllers were aware that the loose rock cover could seriously damage the low-slung C-133 propellers and might even be ingested into the aircraft's jet engines.

The strip offered no particular difficulty, however, for Douglas C-124 piston-engine Globemasters. The answer to the problem of getting the full required cargo to La Paz in the shortest time, making use of the superior cargo capabilities of the C-133 and still protecting it from possible rock damage, lay in flying a C-124 shuttle from Lima, Peru, on the coast, to La Paz, over the mountains. Accordingly, three C-124 Globemasters were flown direct from the United States to La Paz with a total of 27 tons of equipment. Meantime two C-133's and three C-124's flew from the U.S. to Lima with a total of 106 tons of equipment. The 106 tons of cargo was then shuttled from Lima to La Paz by C-124 type aircraft. Since the time of that operation the loose rock at La Paz has been impacted into the runway, and the field is considered adequate for use by C-133 aircraft.

Ireland to Congo. The dates 7 November through 17 November saw another United Nations' 4900-mile troop rotation into the Congo. This time it was airlift of Irish troops from Dublin, Ireland, to Leopoldville. The missions were flown with eight C-118's and one C-133. Cargoes included 45.1 tons and 696 troops south to the Congo and 16.7 tons and 581 personnel back to Ireland. The operation

sions. When the assignments were completed, the aircraft returned to Germany for the Long Thrust flight back to the U.S.

Rapid Roads. This operation involved the airlift of U.S. troops within the United States. Both the new Boeing C-135 jets and MATS piston-engine transports were used during the first nine days of October to fly a total of 308 missions, transporting 12,000 troops and 2000 tons of cargo.

Congo. From the 10th of October through the 16th of October, a C-135 Stratolifter airlift moved 1232 Swedish troops and 16.6 tons of cargo for the United Nations into the Congo. It was the first all-jet airlift into the Congo by MATS aircraft, which have been providing airlift support to the United Nations' effort since July 1960.

Although the original Congo operation by MATS was performed for 16 months by an airlift task force operating from Chateauroux AB, France, today MATS Congo airlift missions are flown on a special assignment basis from the continental United States. Ninety per cent of all cargo and 79 per cent of personnel airlifted for the United Nations' Congo effort have been flown by MATS.

The Swedish troop rotation from Stockholm to the Congo and back was 4900 statute miles one-way, the aircraft making the distance nonstop in an average of 10 hours. The lift required 4 aircraft and a total of 19 missions. Returning home, a C-135B set an unofficial MATS record by flying nonstop 6000 nautical miles from Leopoldville to McGuire in 13 hours.

MEANWHILE the Cuban crisis was coming to a head, and MATS was alerted to be in a posture to execute possible contingency plans. Let's see where we stood at this point in time.

Worldwide, MATS missions for Long Thrust V, the Swedish U.N. rotation to the Congo, and U.S. Army Rotoplan were completed by 22 October. By now the full MATS global airlift force was operating at peak capability for both Cuban and global requirements of the Department of Defense. Conventional and routine requirements levied by MATS users were not ignored nor unduly delayed during this period. Although much of the MATS active airlift force was withdrawn from the normal airlift requirements around the globe, depot levels of priority freight did not get out of hand nor were rotational passengers delayed. However, to ensure that only priority items were airlifted by the military force, MATS users were notified to divert all outsize cargo to other transportation whenever possible for an indefinite period.

By 23 October the MATS airlift capability was saturated with Department of Defense requirements, and clearance was given to move all passengers and cargo possible by commercial airlines. Normally, MATS airlifts about 55 per cent of DOD routine channel traffic on commercial carriers. And it should be noted that from fiscal 1961 to fiscal 1962, in line with its long-range policy of utilizing contract commercial airframes to the greatest extent possible, MATS increased its use of commercial airline facilities by 15 per cent for passenger travel and 25 per cent for cargo lift. Thus during September 1962 a total of 69 per cent of all DOD passenger channel traffic was carried by contracted commercial facilities, and 42 per cent of the cargo requirements were flown by commercial means. The necessity of keeping cargo flowing through the aerial ports of embarkation on the East and West Coasts and at the same time meeting priority commitments for Cuban contingency airlift boosted the percentage of civilian contract cargo by 14 per cent to 56 per cent during October.

It is interesting to note that passenger requirements for commercial airlift actually dropped only 4 per cent during the crisis. MATS ordinarily expects, and had programed, a drop of 25 per cent in passenger movement during October. This dip is routine in view of the fact that the largest volume of passenger movement always occurs in the late spring and summer, the traditional time of year for troop rotation on permanent change of station outside the U.S.

The use of percentages of cargo and passengers airlifted does not give the full picture, however. Military requirements for airlift are

specific, immediate, and, at times as the result of sudden new needs, erratic. A great deal of flexibility is required for an operation that for 12 hours might require very few aircraft but that in a matter of minutes could receive levies for peak capacity during the next 12 hours. The result is a series of peaks and valleys of activity which, despite preplanning, occur in military requirements.

Such a condition occurred in the commercial airline picture during the third week of October. Although the commercial airlines had the capability to transport passengers and cargo if given the lead time to plan such flights, DOD requirements, particularly for cargo, were sometimes so urgent that the commercial airlines could not always meet demands at exactly the time and place required and still keep their own commercial schedules.

Meantime actions were under way to increase the operational readiness of MATS Air National Guard and Reserve units. In addition two Guard units recently released from active duty with MATS following the Berlin crisis call-up (the 133d Air Transport Wing, Minneapolis, Minnesota, and the 146 ATW, Van Nuys, California) volunteered for missions. The offer was accepted, and their Boeing C-97 piston-engine aircraft were given 29 missions to Greenland and South America hauling 266 tons of cargo.

India. Even as the immediate press of the Cuban crisis slacked off, MATS global airlift requirements continued to flow in. On 2 November, C-135 crews from McGuire and Travis were given a special airlift assignment to Europe to pick up arms for India. Flying the equipment obtained both from arsenals in the United States and from American installations in Western Europe, the Boeing jets delivered 941 tons of battle gear to Dum Dum Airport, Calcutta, in 45 missions over a two-week period. The situation provided an ideal demonstration of the capability of the big jets. The aircraft, which had been showing an average daily utilization rate of almost 5 hours per airframe, revealed qualities of quick reaction and versatility for use in almost any contingency. Average round trip for the aircraft was 12,000 statute miles.

La Paz, Bolivia. The arms lift to India did not represent the last of the extraordinary missions within the time span of the Cuban crisis. On 5 November a rush airlift of 134 tons of communications and electrical gear was required for La Paz, Bolivia. What appeared as a routine "milk run" to assist a South American neighbor posed some interesting airlift problems. The airfield at La Paz is situated at 13,300 feet altitude and at the time of the airlift requirement was liberally strewn with a cover of coarse stones. Although MATS giant C-133 aircraft, with their capacity to carry more than 30 tons per load, would have been the preferred aircraft for such an immediate lift, MATS controllers were aware that the loose rock cover could seriously damage the low-slung C-133 propellers and might even be ingested into the aircraft's jet engines.

The strip offered no particular difficulty, however, for Douglas C-124 piston-engine Globemasters. The answer to the problem of getting the full required cargo to La Paz in the shortest time, making use of the superior cargo capabilities of the C-133 and still protecting it from possible rock damage, lay in flying a C-124 shuttle from Lima, Peru, on the coast, to La Paz, over the mountains. Accordingly, three C-124 Globemasters were flown direct from the United States to La Paz with a total of 27 tons of equipment. Meantime two C-133's and three C-124's flew from the U.S. to Lima with a total of 106 tons of equipment. The 106 tons of cargo was then shuttled from Lima to La Paz by C-124 type aircraft. Since the time of that operation the loose rock at La Paz has been impacted into the runway, and the field is considered adequate for use by C-133 aircraft.

Ireland to Congo. The dates 7 November through 17 November saw another United Nations' 4900-mile troop rotation into the Congo. This time it was airlift of Irish troops from Dublin, Ireland, to Leopoldville. The missions were flown with eight C-118's and one C-133. Cargoes included 45.1 tons and 696 troops south to the Congo and 16.7 tons and 581 personnel back to Ireland. The operation

took 29 missions. It forms an interesting comparison of aircraft capabilities to the earlier and speedier Swedish troop rotation accomplished in just six days, using four C-135 jet aircraft in 19 missions over approximately the same distance.

Venezuela. On 13 November another extraordinary and unexpected airlift started. This was to Venezuela, using a Douglas C-133 Cargomaster. The Creole Petroleum Company, on Lake Maracaibo, Venezuela, had become the victim of Communist sabotage. The loss of oil revenues to the government of Venezuela was mounting to $8 million a day. The U.S. State Department called on MATS, as possessor of the only operational aircraft large enough to airlift the necessary big generators and switch gear, to fly the replacement material to the South American nation.

Guam. Also on 13 November requirements were received for the humanitarian type of airlift that MATS crews have become accustomed to flying anywhere and anytime—in most cases without lengthy prior notice. Only hours before, Typhoon Karen, with winds up to 175 miles an hour, had hit the mid-Pacific island of Guam. Relief in the form of blankets, tents, field kitchens, medical supplies, generators, and all types of emergency supplies was needed immediately. The first C-124's were en route to Guam approximately two hours after the call. C-135's from Travis and McGuire, some just back from the Indian arms lift, took off within minutes. When the lift ended on 18 November, more than 800 tons of emergency gear had been flown the long overwater leg to Guam. The average round trip was 6000 statute miles in roughly 12 hours flying time in the jets. Coming home in the C-135's were 726 homeless military dependents.

Arctic. Before the Guam relief aircraft were all airborne, MATS received still another call for an emergency mission. MATS C-124's with air cargo drop capability were needed to fly aid to an American scientific expedition spending the winter on an ice island 300 miles south of the North Pole. The cargo was 20,000 pounds of fuel oil to be airlifted 1800 miles north of Elmendorf AFB in Alaska.

Operation Deep Freeze. At the other pole, the Globemaster resupply of the antarctic scientific stations called Operation Deep Freeze which had started early in October was continued. When the operation was completed, 95 drop missions had been flown and 58 round trips were chalked up from Christchurch, New Zealand, to McMurdo Sound.

Afghanistan. As the Cuban crisis period ended, the 125th Air Transport Group of Oklahoma's National Guard put a dramatic clincher to claims that the MATS National Guard units are a global force. Flying a C-97 on a MATS-directed mission, the Guardsmen flew west to east on a 14-day, 21,000-mile route around the world, delivering 14 prize breeding cattle to the people of Afghanistan. The miniature herd was a gift of seven of America's leading cattle breeders in the interest of international friendship for use in a program to develop better stock in predominantly agricultural Afghanistan. The mission took 100 hours of air time, ending on 28 November. Headquarters of the ANG group in Tulsa reported they believe neither the round-the-world crew nor the aircraft will ever be the same again.

The missions noted here, which represent a cross section of MATS airlift activities for the 1 October–15 November period, yield some interesting totals. More than 13,000 tons and almost 35,000 personnel were airlifted. This would take a train of some 945 railroad cars, more than 10 miles long. Even so, these figures do not include the tonnage and passengers contracted by MATS for commercial carriers.

ALTHOUGH the discussion thus far has been primarily concerned with airlift force actions, MATS technical services were also in a maximum-effort posture. Just as it affected the MATS airlift operation, the Cuban crisis affected Air Weather Service activities in varying degrees around the world. In addition to "saturation" weather reporting required over the southeastern United States and Caribbean area, the important job of supplying special weather analysis on a global basis was also stepped up.

Major commitments in the United States fell on two units. They were the 2d Weather Group, servicing elements of TAC and the U.S. Army, and the 9th Weather Reconnaissance Group. Also involved were elements of the 3d and 4th Weather Wings supporting aircraft dispersal operations of SAC and ADC, a mobile team of the 6th Weather Squadron (Mobile), and the 8th Weather Group, which, in addition to servicing MATS and reserve troop carrier deployments, provided weather forecasters to CINCAFLANT.

The operational nucleus around which the 2d Weather Group supported the contingency action was the Weather Task Force (WETAF), representing 21 per cent of the total forecasters and 10 per cent of the total observers of the Group. The WETAF concept, under development for almost two years, was designed to provide each major force element of TAC and Continental Army Command with a small cadre of specially trained weather personnel at its base or garrison station. For example, weather units supporting Army airborne divisions had small cadres of field-qualified weather personnel who were also airborne-qualified. When tankers, fighters, troop-carrier aircraft, and troops were deployed, their associated weather cadres deployed with them. Weather communications and tactical weather equipment were prepositioned and load-listed to accompany weather personnel as required with the senior officer assuming command of the deployed weather forces.

This system produced a functionally aligned tactical weather support unit tailored to meet the unique needs of deployed tactical air and ground forces. Planning was based on experience gained in the 12 months previous to the crisis when the 2d Weather Group exercised the WETAF concept numerous times in STRICOM operations. When the Cuban contingency arose, the weather group was ready to go, with the in-being capability to produce weather data as soon as the first deployed fighter squadron arrived in Florida.

At the outset of the operation, a command post was established at Headquarters 2d Weather Group at Langley AFB, Virginia, to control available resources and to coordinate the response of the various field weather elements to the needs of the commands involved. The problem of providing sufficient forces to meet contingencies without seriously weakening base and garrison support was accentuated by the Cuban operation. As a result, recommendations are under study for adding specific personnel authorizations and earmarking them throughout the 2d Weather Group as a cadre of tactical weather personnel to deploy with supported forces without sharply curtailing the base and garrison support.

In the area of ground weather support, the Air Weather Service Climatological Center at Asheville, North Carolina, furnished tailored climatological data on probabilities, by hours of the day, for low, middle, and high-level photographic reconnaissance, fighter-bomber strikes, and airborne operations. Such information, of course, is vital to operations like this.

The weather reconnaissance effort began on 29 October with twice-daily flights around the periphery of Cuba by WB-50's of the 53d Weather Reconnaissance Squadron based at Kindley AFB, Bermuda. Three aircraft and crews from the 55th Weather Reconnaissance Squadron at McClellan AFB, California, were deployed to Kindley to augment resources of the 53d Weather Reconnaissance Squadron. The daily flights covered 3350 nautical miles each and were flown a minimum of 40 miles offshore from Cuba. Weather observations were taken every 20 minutes while circling Cuba, and the data were transmitted to Langley and Homestead Air Force Bases.

The full effect of increased Air Force operations was also felt by the Air Photographic and Charting Service. With headquarters at Orlando AFB, Florida, the APCS is charged with the responsibility of documenting all Air Force activities during any period of more than routine activity. Photographic capabilities in Florida were augmented by 135 cameramen and laboratory technicians from the West Coast and Colorado Springs. Simultaneously 54 combat documentary photographers were deployed to operating locations to supply documentary film on the buildup in the southeastern United States.

MATS Operations Worldwide

Operation Deep Freeze, for which C-124's have airdropped tons of supplies to ice-locked antarctic scientific stations. When MATS capabilities were most fully committed to the Cuban operation, the command also retained its mission to provide global airlift for the Department of Defense, on a regular basis and as emergency need dictated. Only a part of MATS strength focused on Cuba as cargo and rescue aircraft ranged worldwide to satisfy national, allied, or humanitarian needs.

MATS command posts around the world plot movements of command aircraft. All MATS aircraft can be located instantly for diversion to any urgent mission. This worldwide airlift command and control system is unique within MATS.

Typhoo
from G

Typhoon Karen victims are airlifted from Guam to Travis AFB, California.

Early in November, 12 MATS Stratolifters delivered 900 tons of arms and equipment in 45 missions to India. Cargo is unloaded at Dum Dum Airport, Calcutta.

The Long Thrust V exercise returns Army troops from Germany via C-135B nonstop to Fort Riley, Kansas.

In order to obtain the best possible action photographs, Air Photographic and Charting Service technicians, working on a crash basis, devised and installed forward- and rear-looking 16-mm motion picture cameras under the center bomb shackles of six F-100 Supersabres of the Tactical Air Command. Rear-seat motion picture cameramen were assigned to TAC aircraft to cover tactical operations in a more routine manner. Further tests of the 16-mm camera pods on TAC combat-configured F-100's indicate that adequate over-the-target documentation of weapons employment can be obtained. High-speed, low-altitude test runs with pods fitted to RF-101 Voodoo reconnaissance aircraft at MacDill AFB show promise of application to reconnaissance and en-route-to-target films. APCS intends to continue the development of a sophisticated camera system for possible use by all tactical fighter-type aircraft. The project centers on a quick-change camera angle mechanism that enables the cameras to be declined zero to thirty degrees from horizontal in five-degree steps. A quick release for the camera control junction box enables rapid replacement. Protection will be provided by a stream-lined cover for the entire camera pod to protect the camera and reduce high-speed drag.

The MATS Air Rescue Service also had a heavy load to carry. The Air Rescue forces provided daily precautionary coverage in support of reconnaissance and fighter missions by aircraft of the Air Defense Command, Tactical Air Command, Navy, and Strategic Air Command. At the height of the crisis, 14 fixed-wing aircraft and 8 Air Rescue helicopters provided continuing fire suppression and local base rescue support at Homestead, MacDill, McCoy, and Key West. ARS controllers were on 24-hour duty at CINCAFLANT headquarters at Langley AFB, ARS headquarters at Orlando AFB, and other locations in the Florida area. Several hundred additional personnel were placed on temporary duty with augmented base rescue detachments and rescue squadrons, while at MacDill and Homestead pararescue men with self-contained underwater breathing apparatus (SCUBA) stood by for possible action. Air Rescue personnel were airborne immediately on 27 October when a SAC U-2 reconnaissance aircraft was lost on a mission over Cuba.

IN RETROSPECT, the military history of the actual Cuban quarantine action was one of intense preparations in a greatly compressed time period. For MATS the Cuban emergency was the test of three years of conceptual changes in the airlift mission that have resulted in major changes in the posture and activities of the command. In that period MATS has evolved from an airlift force emphasizing routine scheduled missions along fixed air routes to a proved global military airlift command concentrating on special-assignment airlift and joint armed forces mobility exercises.

MATS was formed in 1948 as a unified air transport command to consolidate the long-range airlift resources of the Air Force and the Navy. Operating under a single global command and control system, these resources are available to the Joint Chiefs of Staff for military actions anywhere and provide a high degree of mobility on a global scale. MATS also controls certain specialized technical services which lend themselves to single managership and enhance the effectiveness of all forces of the Department of Defense. Working together, these elements provide airlift, route coverage and air rescue service, global weather and environmental data, and the geodetic basis for accurately positioning aerospace vehicles throughout the world.

MATS is authorized a total of 1046 aircraft, a little more than half of which are allocated to the airlift force. The remaining aircraft are assigned to the technical services, independent units, and administrative support, and because of design characteristics or special modifications they are generally unsuitable for troop and cargo airlift. Command strength is slightly more than 86,000, a figure that includes civilian personnel as well as some 3000 Navy people. The Navy personnel are assigned to staff tasks in addition to operating three flying units of the 35 transport squadrons in the MATS airlift force.

Activities of the three technical services

and independent units account for more than 24,000 personnel, about one third of the MATS manning. An additional 21,000 personnel are employed in operating the global complex of 59 MATS installations—including 7 major U.S. bases—and providing base services for MATS units and non-MATS tenants, such as the Strategic Air Command, Air Defense Command, Army, and other organizations located on MATS bases. The remainder, a little more than 39,000 people, are directly engaged in the pure airlift functions of MATS—in the operational transport and troop carrier units.

The entire MATS structure is oriented toward a single basic aim—responsiveness to the global requirements of the Army, Navy (including Marines), and Air Force. But that responsiveness to any degree of emergency can exist only to the extent that MATS, as a full-time active-duty member of the defense team, is D-day ready every day. MATS units have been in full-time training for military emergencies since formation of the command 15 years ago. Every day, as a matter of course, MATS exercises its global airlift system in all phases of its mission. In actual emergency, as demonstrated during the Cuban crisis, it has only to step up the tempo of what it has been doing all along, without the necessity for shifting into new or unaccustomed modes of operation. For MATS, in effect, the only operational difference between war and peace is one of degree, not of kind.

MATS' daily training program is a complex of interrelationships. It encompasses joint exercises, mobility tests, special-assignment airlift missions, logistical support, and medical airlift with and for—among others—Strategic Air Command; U.S. Army in Alaska; Tactical Air Command; U.S. Army in Europe; Continental Army Command; U.S. Strike Command; U.S. Army in the Pacific; the Commanders-in-Chief, Atlantic and Pacific; U.S. Naval Support Force, Antarctica; Air Force Systems and Logistics Commands; U.S. Air Forces in Europe and the Pacific; National Aeronautics and Space Administration; and the Department of State.

The Fleet Marine Force is the latest addition to the list of MATS airlift users. The MATS airlift of thousands of U.S. Marines to the East Coast and to Guantanamo Naval Air Station from California demonstrated anew MATS' capability to move large masses of men and military cargo over great distances with speed and efficiency. Marine airlift missions are now scheduled in the same general manner as MATS commitments to meet U.S. Army airlift needs.

In addition, MATS has been called upon almost constantly since 1948 to operate emergency airlifts for cold war, diplomatic, and humanitarian purposes. More than 30 major lifts have been performed, ranging from the Berlin Airlift of 1948–49 to MATS participation in the three-year-old Congo airlift under United Nations auspices.

Specifically, the Cuban experience demonstrated again that in any emergency situation MATS is often the first to "go." MATS must be able to expand immediately and sustain airlift capability in order that combat forces can achieve their own readiness posture. MATS must fly the troops and materiel into the action area and, when that is accomplished, be ready immediately to carry out its part in combat operations. At the same time MATS must also be prepared to meet other emergency requirements (such as the India airlift and the Guam typhoon airlift which arose at the same time as the Cuban crisis), maintain its general war posture, and meet the scheduled airlift requirements.

It should be noted that MATS can operate with such freedom only so long as air supremacy is on its side. In addition to the vital local tactical air-superiority requirement, it is only because of the existence of an umbrella of strategic deterrence maintained by the strategic retaliatory forces of the United States that missions of the MATS airlift force and technical services can be performed successfully and without hindrance on a worldwide scale.

The broad scope of MATS commitments requires topnotch personnel versed in all phases of global airlift. It also means that crews and support personnel must be trained to exploit fully all capabilities of their particular aircraft. If an aircraft is capable of airdrop operations, for example, then all personnel in all units equipped with this type of aircraft

must be trained in this aspect of its capability. Procedures are being standardized so that any crew can participate in any mission within aircraft performance limitations, and complete flexibility for recycling the force always exists. An inadequate training program will just as surely render an organization inoperational as will a shortage of fuel or equipment.

The Cuban crisis showed that the physical modernization of aircraft for MATS airlift and technical service forces, begun in 1961, is now paying off. It also demonstrated that without the 44 Boeing C-135 jet Stratolifters' bearing a big load in the MATS force, the command could not have done the job as well. Reaction would have been slower; some of the military requirements would have been deferred.

This program of airframe modernization has greatly increased MATS' capability, posture, and ability for immediate reaction to meet contingency requirements. And more new aircraft are on the way. Additional C-130E aircraft are in production, and as they come in, the active C-118 and C-121 force will be phased down. But MATS is particularly looking to the C-141 Starlifter, now under development by Lockheed Aircraft Corporation and expected to take its maiden flight late in 1963. This aircraft has been designed primarily for air cargo operations. Its truck-bed loading height and turbofan engines will give MATS the cargo-carrying and paradrop capability, long range, and quick reaction needed to execute the deployment of strike forces. It is expected to be operational in 1965, with a full complement of more than 200 to be in the system by 1968. It is anticipated that in the coming years MATS will be able to double the amount of work it can perform with half the number of aircraft in the present inventory.

Finally, the Cuban crisis demonstrated the value of the MATS worldwide command and control system that enables the operational controllers of the airlift force to bring the capabilities of the system to bear at any time and place which best serves the national interest. The MATS airlift control system works on an area basis allowing controllers to monitor the flight progress of each aircraft movement continually and maintain precise data on the status of each aircraft on the ground. The system permits en route aircraft diversion or rerouting for emergency requirements and control of the flow of large numbers of aircraft over routes congested as the result of large-scale operations. In addition to MATS contingency missions during the Cuban crisis, worldwide commitments for MATS aircraft were monitored as a routine task by the major MATS Command Posts at Scott, McGuire, and Travis.

THUS, the Cuban experience proved three things to MATS. One—there is no substitute for professional competence honed daily on the whetstone of global airlift missions. Two—there is no substitute for high-performance pure jet and turboprop aircraft, since use of piston-engine airframes must be paid for in terms of limited cargoes, extended delivery times, high maintenance requirements, and unnecessarily high expenditure of flying hours. Three—and most important—there is no substitute for the MATS global command and control system when airlift requirements are immediate and range across the world.

In summary, the Cuban crisis demonstrated again that MATS must and can react quickly to either planned or unplanned emergency requirements with the means for a fast, flexible U.S. response to any place on the globe within the arbitrary time limit of military circumstance. This is the key to whether or not the system is responsive, since modern combat forces—the men, the guns, the supplies—must be moved globally within sufficient time to make their delivery decisive.

Headquarters Military Air Transport Service

TERMINOLOGY CONTROL AND NATIONAL STRATEGY

WOODFORD A. HEFLIN

PEOPLE in government are increasingly concerned with the possibility of organizing certain aspects of our language to help achieve national and international goals. In some respects, this is only to improve the celerity and certainty of communication, especially as required by electronic devices. In other respects, however, the concern is to establish set choices between different ways of expression and to offer guidance on the choice of words and phrases, the object being to obtain desired reactions in listeners or readers. This raises the question of what areas do, and what do not, show the greatest promise for effective guidance.

Preliminary to identifying such areas, terminology guidance may be said to have four steps. The first is to envisage the kind of reaction or understanding desired in the listener or reader. The second is to choose the words or phrases to obtain the desired reaction. The third is to win the cooperation of language users and get them to accept the guidance offered. The fourth is to penetrate the target, which consists of those we seek to influence.

These steps are interrelated, but the second and third are the key to the other two. Objectives must be chosen in terms of the possible. The "possible" in this case boils down to what the language will permit us to do and what the users of language will permit us to do. This calls for some understanding of what language is.

Among other things, language is a product of differentiation in the human brain. Like binocular vision, it arises from an association between thought and symbols. The symbols may be uttered through the vocal cords or expressed by signs, gestures, or nonvocal noises. Or they may be released in the form of electronic signals or committed to some form of writing. Whatever the symbols may be, however, they represent meaning. The user and the receiver must each understand what the symbols mean.

This introduces the element of discipline and conformity. But the discipline is not a simple matter, such as you would use in Morse code. This is because meaning is complex and subtly different in a great variety of circumstances. The discipline takes the form of a complex relationship or system that reacts with the structure of the language itself. It grows and accommodates itself to the needs for communication and does so under the interplay of new ideas mixed with old and of new symbols mixed with old, endlessly adapting to variations in ideas and concepts.

Underneath discipline is the structure of

the language itself. This also grows. It makes way for new symbols and new meanings affixed to old symbols. Yet despite its constant change, the language retains the basic character of its previous growth. Some of it may be recognized as having survived from the earliest times.*

Language is also something more than a medium of communication. The association between thought and symbols is so close within the differentiating parts of the human brain that an interaction takes place. That is, not only does thought generate symbols and an orderly juxtaposition for them but symbols generate thought. Symbols thus become abstractions for concepts. This provides the basis for relating concepts with each other, gives precision to analysis, and becomes a vehicle for logical thought. Thus a language, first learned as a discipline for communication, becomes a tool used within and by the brain to arrive at new concepts and understandings.

So, however simple were its beginnings in each person's experience, the language as used by the adult becomes a highly complicated structure responsive to external stimuli, internal wants, psychological interplay, and the powers of reason. Moreover, language is an inheritance, but not in a biological sense. It has to be learned by an act of will by every person who uses it. It is like a body of scientific knowledge, which also must be learned all over again by each new person who shares it. Yet language is something different from knowledge. It is a skill, like playing the piano, whereby perception and understanding are transformed into signs and symbols. Like other skills, a language is learned by practice, by adjustment and correction, by self-discipline and training—each repeated effort being directed toward conforming with the speech patterns of those who have already acquired the skill. It is this goal of conforming that lends continuity to the language from one generation to another. The patterns that result are strong, deeply grooved, and constantly reinforced by repetition.

And yet, because the patterns of language are inherited in a sociological sense, not in a biological, they are subject to change by personal or collective effort. Circumstance and logic can contribute to the exertion of such effort, and language can be made to serve ulterior ends. This is why living men can, in fact, influence trends or change the direction of growth. In such matters the common man is often mentioned for his influence. Others too—grammarians, dictionary makers, magazine editors, and even control bodies—can also exert such influence. The effort, however, must be kept within the bounds of the feasible. Effectiveness can be expected only when deeply established patterns and trends are taken into account. This is why an understanding of language is important to the process of terminology guidance.

A NUMBER of attempts have been made within government to influence word usage. Some of these have been successful, and some have not. I propose to examine a number of these and then make an effort at generalization.

An example at one end of the spectrum—the easy end—was the case of *Porto Rico*. This happened long enough ago to permit an objective assessment of results. It happened in May 1932 when the official name of the island territory was changed by act of Congress from *Porto Rico* to *Puerto Rico*. Behind this event was a long history, complicated by a particular set of circumstances.

*Despite the fact that our own age has added thousands of new words and adjusted old words to radically new concepts, the English that we speak and write today is basically the same language that Shakespeare in the sixteenth century and Samuel Adams in the eighteenth century used before us. Even Middle English and Anglo-Saxon, although difficult at first to understand, are recognized as earlier stages of modern English. As we learn them, we are struck by the antiquity of many expressions in modern usage; we discover that connotations cling to words and travel backward, sometimes even to our early ancestors. We also realize that certain words in English must have existed a long time before they were written down, for writing is of comparatively recent origin. Such words could have been transmitted by the same means that children today learn the vocabulary of their parents. We even find the evidence that supports this realization, for if we look into the languages of other members of the race, that is, of the ancient Indians (Sanskrit), of the ancient Greeks, Persians, and Romans, we find that they too had words that had identical roots with our own words, establishing a high probability that these word roots existed before members of the ethnic group who spoke the mother tongue separated and migrated apart. These word roots are what we would expect them to be. They are symbols that stand for concepts that would have been known to speakers of the mother tongue. They include the names of family relations, like *mother, father, brother,* and *sister;* also the names of celestial objects, like *star, moon,* and *sun;* numbers like *five* and *ten;* words like *night* and *day;* and the word *now* is among them, and, importantly (for anthropologists), the word *wheel.* Curiously, no word properly meaning war was common to the ancient branches of the mother tongue.

Under Spanish rule, the name was consistently *Puerto Rico*, spelled "ue." All the Spanish records I have examined are alike in this respect, running from the sixteenth century to the twentieth century. It is possible, however, that an "o" spelling was at one time used in Spanish, either as a dialectal variant or under the influence of the Portuguese, as in *Porto Bello*. One authority claims that Ponce de Leon himself named the island *Porto Rico* in 1508, but I have not been able to verify this. In any case, the normal Spanish spelling was "ue," fixed by authority of the Spanish Academy in the early eighteenth century. This is the way it appears in the Spanish text of the Treaty of Paris (1898).

On the other hand, the "o" spelling was also of long standing, but primarily in English. From 1554, when Roger Barlow used it, down through the first third of the twentieth century, the "o" spelling was normal among English and later among American writers. It was the spelling used by Thomas Jefferson and his contemporaries; it was the spelling predominantly used in State Department papers and correspondence throughout the nineteenth and early twentieth centuries; it was the adopted spelling of the United States Geographic Board after 1900; it was the normal spelling found in American periodical publications (a notable exception being *Harper's Weekly*); and it was the spelling of the English text of the Treaty of Paris.

Events between 1898 and 1932, however, caused Congress to decree the name should be *Puerto Rico*. One of the factors was the changing literacy among Puerto Ricans. In 1898 the people of the island were generally illiterate. Thirty-four years later, through American programs in education, the populace had become highly literate in Spanish and proud of their Spanish culture. If, during the years, the American administrators had been more skillful in handling complex social and political matters, it is possible that no great issue would have been made of the territory's name. But since, in fact, the issue was raised, the Puerto Ricans asserted their own self-respect by insisting upon a correction in the spelling of the island's name. Quick to see advantages in this, politicians began agitating for the correction soon after World War I. They brought their campaign to a climax when the Porto Rican Legislature adopted a resolution on 3 April 1930 asking Congress to make the change.

Another factor in the decision was the depression. It had struck hard at the territory's economy, just as it had struck at the economies of the United States and other countries. The Federal Government, faced with widespread unrest among persons who sought not only to change their economic condition but also to make changes in political institutions, was pressed to do something. Thus, when an opportunity arose to appease the Puerto Ricans by authorizing a change in the spelling of the territory's name, Congress acted not strictly on linguistic grounds but also on economic and political grounds—a kind of psychological concession intended to lift the spirits of the people.

Once the new spelling was made official, usage among writers changed overnight. This, of course, was more or less automatic among writers of government publications, but others also quickly followed suit, and it is rare today to find the "o" spelling in writing. In pronunciation, however, the evidence is not so clear. Relatively few people have occasion to write about Puerto Rico, whereas many people have occasion to speak the name from time to time. Obviously, not all of these use the diphthong pronunciation. But it doesn't matter if they do or don't. The guidance postulated pertains to the written word primarily. Thus, it may be said that the guidance has been effective.

As the case of Puerto Rico indicates, the name of a country can be arbitrarily changed by an authority that has control over the country. Thus the Gold Coast has become Ghana, the United Provinces of Agra and Oudh have become Uttar Pradesh, Persia has become Iran, and the Irish Free State has become the Irish Republic.

Behind each of these changes was a strong motivation, and each change was expected to advance the interests of the nation concerned. Also the new name was aligned with what was possible in terms of language usage. It thus became easy for an authority to decree the adoption of the new name.

But do these instances indicate that a control body can be effective in guiding the adoption of other names? Perhaps. Yet the degree of effectiveness must depend upon two factors: (1) the kinds of names involved and (2) the extent of the guidance to be imposed. For example, if a control body decreed that the name *Europe* or *Africa* should be dropped, effectiveness could be expected to be small because numerous persons outside the influence of the control body would still use the old name. On the other hand if the control body suggested a playing down of a word like *Nato*, the suggestion could prove effective. This would not mean dropping the name altogether but rather using alternative expressions. The user could then judge the probable effects of different words on the listener and make his choice in terms of a desired reaction. In May 1961 a story got out among news commentators—just before discussions began between the President of the United States and the President of France—that the Americans would probably avoid using the phrase *Nato Alliance*. Instead, it was believed, they would talk about the *Atlantic Alliance*. The news commentators argued that Nato was a touchy subject with the French President, as well as with non-Nato countries, and the alternative expression *Atlantic Alliance* could deal with the same subject matter without arousing the same emotions. As things turned out, the Americans apparently did not shy away from the word *Nato*, but the point was still made. A choice was available if desired.

British experience offers examples in which names have been manipulated to obtain desired responses. One of these was in nineteenth century India, where for a short time one of the official designations for British or English troops was *European troops*. This designation could be used to take attention off the fact that it was the British primarily that controlled India, and it did not entirely lack accuracy as a descriptive term, especially if a distinction was to be made between English troops and Indian troops under British control. Yet its use did not necessarily eliminate the use of other terms for the same body of soldiers. In other words, the difficulties in decreeing a discontinuance of *English troops* were avoided, but at the same time an alternative appellative was made available if a situation arose that made its use preferable.

Now and then an administrator tries to get everyone to use the same word for a particular object. This, it is said, is in the interest of avoiding ambiguity. The approach, however, leaves out of account the use of vocabulary to obtain desired emotional responses. Nor does it take advantage of the language's nuances and connotations.

The same point may be illustrated by another British example. In 1931 the British met a growing psychological and political problem in their own empire by adopting the name *The British Commonwealth of Nations*. In doing so they did not abandon the name *British Empire*, for in certain situations they still had need for this name with its particular connotations; but they provided themselves with an alternative name that could be used in certain other situations where an emphasis upon the Empire was to be avoided. The new name also had a built-in device for playing down the British end of the deal, for the new name could be, and was, shortened to *The Commonwealth*. The Englishman had already shown himself adept at this kind of verbal interchange. He already had three names for his own country: *England*, *Great Britain*, and *United Kingdom*. Also, in certain contexts, *British Isles* could be used.

The point is that different words or names used for the same object have different connotations. A user who is at all aware of the many instruments available to him within his language naturally selects the term most suitable to his purpose. This practice is firmly established in language usage; a control body that attempts to set it aside would probably find its decrees becoming ineffective. The control body, however, can attain its objective by pointing out the different reactions expected from the use of certain words or expressions, then suggesting ways of using other terms in accordance with the desired ends.

The areas in which this kind of guidance can be made effective are several, but they are all areas in which emotional responses are potentially present. Guidance in identifying and using words of this nature seems a proper function within government, if undertaken by persons acquainted with both the issues at stake and the possibilities within the language being used.

Words used with propriety and effectiveness in one context of time or circumstance cannot always be counted upon to meet the same standards in other contexts. For one thing, the issues change, the objectives change, and words pick up or slough off connotations that make them unfit for continued use. A good example of this is the phrase *Dark Continent*, which was first applied to Africa in 1878 by the explorer and journalist, H. M. Stanley. At the time the phrase provoked no adverse reaction, and Stanley intended no offense to the people of Africa by the appellation. His purpose was simply to describe for his readers an Africa that was then both unknown and unenlightened by European and American standards. The epithet *dark* carried both these connotations, and they were readily understood by Stanley's contemporaries. *Dark* connoted something unknown or concealed, as in the familiar phrase, "a dark horse." There is nothing derogatory in this usage. It is an old meaning going back to the time of Shakespeare. The word *dark* also meant destitute of spiritual insight, ignorant, or devoid of knowledge. This sense also was old, going back to the time of Chaucer, and is readily understood in another context, as in the phrase, "the Dark Ages." Thus the word suited Stanley's purpose very well. But in the present climate of world politics, a reference to Africa as the Dark Continent would be considered a slur—and therefore a name to be avoided by people in responsible positions. Today the issues have so changed that the word *dark* would suggest a reference to the racial issue or perhaps to a character defect. These meanings, like the others, are also old, but they are more dominant today than in 1878. The issues of our day have made them so.

Not so obvious as *Dark Continent* are certain other names in which an irritant may be present although unintended. For example, standards of courtesy and tact would require some speakers to talk about the *underdeveloped* nations of the world instead of the *backward* nations of the world. But the word *underdeveloped* may itself be patronizing. In our search for a term that can be used without giving offense, we may even be driven to shift our point of view and actually say something other than what we mean. To avoid using *underdeveloped* or *backward*, we may speak of the *emerging* nations of the world. But this does not say the same thing. An editorial writer in the *Washington Post* in August 1961 referred to these nations as the *new nations*. In doing so he appears to have meant the same nations that are otherwise referred to as the "underdeveloped nations," but he did not actually say so. This lack of precision becomes one of the dilemmas, as objectives or issues change. Actually, the word *emerging* has already acquired a connotation of backward or underdeveloped. To the extent that it has, it has lost its effectiveness in other contexts where no such implication is intended. But so it is with language. A control body, if its members assert themselves too strongly, can spoil other good meanings of words and cause them to become unsuited to purposes they formerly served.

A case in point may be the current word *counterinsurgency*, which is officially defined in the JCS dictionary: "The entire scope of actions (military, police, political, economic, psychological, etc.) taken by or in conjunction with the existing government of a nation to counteract, contain, or defeat an insurgency." In most contexts, despite the official definition, the word is used to apply to the military and political support given *by the United States* to an existing government that is under *military and subversive pressure by the Communists*. The italicized words indicate how usage has given a specific application to the official definition.

Thus the word *counterinsurgency* as used has already departed from its sponsored definition. But more than this, the definition is in conflict, in both its sponsored and evolved senses, with the connotations of its own root elements, a matter that irritates some persons who have knowledge of American history. To the extent that it is an irritant, the official definition is ineffective for its designed purpose; and to the extent that its new meaning is accepted, the word has been damaged for use in its traditional sense. In the first place, it has defensive overtones, suggestive of defending a reactionary regime against its own subjects. In the second place, it implies that Communist efforts are in the nature of an insurgency—which is not so, for Communism is spreading from the centers of Moscow and Peiping, a matter that was clear in Korea and is again clear in the Republic of Vietnam, where the Communist effort is one of external aggression. In the third place, it suggests that insurgency per se is Communist-inspired. This, of course, tends to denigrate some events in our own history, wherein the word *insurgency* described events considered by us to be the foundation of our own freedoms. But still, if the word is used long enough in the currently assigned or evolved sense, the connotations of the term will tend to change and those who are appalled at its distortion must finally accept it.

Although the choice of this term may be deemed ill considered, an alternative term serving in the same capacity is hard to come by, especially if one already established is to be used. Under the circumstances, a new coinage would probably have served the purpose best. This would have left the word *insurgency* alone. In formulating a new word, one should follow the principle of employing the roots of an already established word or words and combining them in such a way as to make a new word with a sense related to the roots. *Subvergency,* for example, would have done this. It combines the notions of the *subver*sive with the notions of insur*gency* and hits the mark exactly to describe what the Communists are up to. In this context *subvergency* could then be used without qualms by everyone, and *countersubvergency* would make sense.

A word with more positive connotations to describe our nation's activities could have been found, I think, in the related and already existent word *resurgency.* For decades the spirit of the free world was either half-dormant or on the defensive. Beginning with the Truman doctrine, however, there was a turnaround, and the free world has gradually come to understand the nature of the conflict. This understanding is now resulting in a rebirth of positive action and resolution. As these come to their crest, the process involved is in the nature of a resurgency: hence the appropriateness of the term. Instead of giving courses of study in negative counterinsurgency, we would offer courses in resurgency. This would lend a note of positive purpose to the national effort, not one of simply being against something.

If used in this context, the word *resurgency* would, of course, soon take on new connotations, but these would be extensions of those already attached to the word. A word that grows by extending its range of connotations and, while doing so, does no violence to its basic meanings remains alive and meaningful; but a word made to reverse the direction of its growth tends to stall and to confound those who have to hear or use it.

One reason for concern with what words can do for us—or to us—is the present climate of world affairs. Emerging or unaligned peoples are sensitive about their backwardness and their poverty. The United States, as a nation trying to improve conditions for these people and to protect them from Communism, is compelled to do everything reasonable to avoid arousing their feelings. At the same time, because our efforts in helping them are made in concert with our allies, we are compelled to take the sensibilities of these allies into account as well. Words can be sharp offenders, or they can be used to assuage and heal.

People in government are generally aware of this big problem. But so many people deal with both our allies and the emerging peoples that it is impossible to persuade everyone to cooperate. Private citizens sound off unnecessary insults, or retired persons formerly in government utter remarks that could better be left

unuttered. In a free society no one can complain about the right of such persons to speak their minds. But those who see the problem can usually do something about it.

Desired responses normally emerge from sincere and open dealing. These responses, however, are helped along by good judgment in using words. For example, there is sometimes a choice between the words *Formosa* and *Taiwan*. Both are in common use today as applied to the island or to the government occupying the island. *Formosa* is the name that was given the island in 1590 by the Portuguese. For nearly 360 years it was normally used among Europeans and Americans, and no particular concern was felt about it one way or the other in respect to Chinese feelings. But it has colonial connotations. When the Japanese occupied the island in 1895, they used the Chinese name for it, *Taiwan*. Then when the Japanese surrendered the island in September 1945, a strong trend set in among speakers and writers in the free world to use the same name, since this was the name adopted by Nationalist China. Today, among those with political sensibilities, *Taiwan* is the word more frequently used. It does not follow, however, that the name *Formosa* is considered offensive by Chinese nationals, but to use *Taiwan* is to show a desire to respect the name that the Chinese themselves have given the island. *Taiwan* is thus a name that a control body in government can suggest as a preference, but the control body should not direct its use. The name is simply one that people in government can form a practice of using through their own education and awareness of modern problems. Although *Taiwan* is displacing *Formosa*, it may be observed that the name of the adjacent strait continues to be the *Formosa Strait*, and nearby islands are still called the *Pescadores*. Perhaps the Chinese name for the Pescadores, *P'enghu Ch'untao*, is too difficult for European or American speakers.

Names that reflect an egocentric world are common among those who live in what we call the West. These names arose in earlier times, and they were natural enough when first used. In adopting them, no one had any idea of exclusion or separateness. But as they have survived in modern usage, their use can create the impression of exclusion or separateness, and to that extent they reflect upon our motives and objectives. Good examples of these kinds of names are *Near East* and *Far East*, which are "near" or "far" only from the standpoint of the European. They connote separateness. They are like the words *Cisalpine* and *Transalpine*, which have survived since Roman times as applied to regions from the standpoint of ancient Rome. Other names in this category are *Middle East*, *the Orient*, and *down under*. These are not necessarily offensive, but even a term like *foreign aid*, which is also in this category, could become so. And a term like *outer Texan*, if ever used, could start a fight. Names in this group can sometimes be avoided. New Guinea can be called *Papua*; the Far East can be called *East Asia* or rephrased to use more specific names, like *China* or *Southeast Asia*. But this cannot always be done. It is hard to come by a neutral name, for example, for the *Middle East* or *Near East*, which are themselves difficult to define exactly.

Among other names in this category there is one that could be used against us from a propaganda standpoint. This is *West* and the associated name *Western countries*. The free world is often identified by these names. They are naturally used among people who think of themselves as living in the Western Hemisphere or western Europe, but they exclude, geographically speaking, Japan and the Philippines and Nationalist China—nations that are members of the free world. In certain contexts the word *West* can be made to appear as the opposite of *East*, although as generally used in this context the opposite that is meant is the *Soviet* or *Communist bloc*. To avoid misinterpretations, users may choose to speak of an *open society* as opposed to a *closed society*, or of the *free nations* as opposed to the *Communist nations* or the *satellite nations*. The term *allied nations* is also an effective term, but it tends to exclude the *uncommitted* or *neutral nations*, or, as they like to call themselves, the *unaligned nations*. *Emerging nations*, as we have already seen, can be con-

sidered somewhat patronizing: Emerging from what?

Guidance within the range of these terms is most effective if kept to a minimum. Except in special cases, individual users can best determine the words best suited to their purpose. The only requirement is to alert the user to the problem. In matters of language it is far better to encourage a variety of ways of expressing an idea than to place a straitjacket upon users. A restriction on the use of words leads to a restriction in the realm of ideas. The user must himself be aware that words normally have various connotations and be smart enough to select the advantageous ones as he writes or speaks.

ONE OF THE least effective areas in which a language control body in government can give guidance is that in which terms are given "standardized" meanings. If the "standardized" meanings assigned are already standardized by common usage, there is no need for further standardization. If the meanings assigned are contrary to already accepted usage, then they will have little chance for acceptance unless they are peculiarly open to control, as, of course, they may be in some special instances.

Much has been written about what is called the "need" for standardized meanings. The philosophy behind this idea assumes that different meanings for a particular word or expression lead to confusion and misunderstanding, that different words for approximately the same idea lead to inefficiency and chaos in communication, and that the existing disciplines that naturally inhere in language go on a holiday. This philosophy, of course, is based upon a misconception of what language is, how it works, and how it grows. In the last analysis, if carried to the extreme, this philosophy would lead to communication by arbitrary code signals, with an enormous input in the number of signals to keep pace with new ideas. Of course this would lead to artificiality. Yet this conception of our language, I believe, has found expression by some government officials.

Under normal conditions, word meanings adjust automatically to context. If an old word is used to apply to a new concept, the fact that it is being so applied becomes evident in context as the new idea evolves. A person who has not followed the line of new thought may fail momentarily to comprehend, but the necessity for comprehension will quickly make him adapt to the word in its new meaning. His mind will still be able to comprehend the same word in its old meaning if context shows it to be used that way. Relatively few words have single meanings. A glance at any general dictionary will show how completely erroneous is the idea that a word has only one single definition. Yet the function that a single word can perform in providing several meanings confuses no intelligent person if the user of the word puts it into proper context. Without being particularly aware of it, we all use the same uttered sounds to mean different things in different contexts.

The process of growth that produces these multiple meanings is normally kept under control by application of a few principles usually observed when a person assigns a new meaning to a word. The new meaning is either an extension of the old or a figurative application of the old. Take, for example, the word *atom.* If some control body had defined this word back in the nineteenth century and had insisted upon the word having only one "standardized" definition, then a new word for each new concept of the atom would have been needed, as scientists came to a better understanding of matter and energy. Instead, the scientists continued to use the same word, but they assigned new concepts to the word, one after another. It may be generalized from the history of this word that control bodies should not attempt to assign standardized meanings to words dealing with natural phenomena. Usage among the learned will take care of the problem.

Another word that illustrates how the language imposes its own disciplines is *taxi,* which is short for *taxicab* or *taximeter cab.* The taximeter when first invented was a device which,

when placed on a public vehicle, did two things: it measured distance, and it indicated the amount of the fare or the tax. This device was at first called a *taxameter*, spelled with an "a," and was first used in Germany. Then the word was adopted by the French and spelled *taximètre*. Later, about 1890, it was borrowed into English from the French. When coining the word, the Germans had followed sound practice, using elements already understood for the new word. Both in French and English, a tendency for short forms soon transformed *taximeter cab* into *taxicab*, then into *taxi*. Thus we obtained a new word by borrowing and by allowing the normal processes of change to proceed. At each juncture of change no confusion as to meaning was present because the new formation grew logically out of the old. The word *logically* here means "by easy and recognizable stages in accordance with language patterns already understood by users."

Then the word acquired another meaning, i.e., the movement of an airplane as it moves about on the ground under the thrust of its own engines except when landing or taking off. How did this word acquire what might appear a very strange meaning? And in doing so, was there confusion among users or listeners? To answer the second question first, there is no indication of confusion at all as the word acquired its new meaning. If there was, it was short-lived. And the answer to the first question lies in a particular circumstance not uncommon in giving direction to word meanings.

Back in 1911 the flying schools at Brooklands Aerodrome near London commonly used two airplanes for instruction. One of these was airworthy and was called the *brevet machine* because the student earned his brevet or certificate after learning to fly this airplane. The other machine was fitted out with various controls, but it was not serviced for flight and was used exclusively on the ground, principally to instruct cadets in making "rounds" and otherwise familiarizing themselves with an airplane. In a jocular vein, the cadets, especially at Armand Déperdussin's school, called this machine a *school bus* or a *bus*, but they also called it a *taxi*. This latter usage was merely a derogatory figure of speech. The word caught on in its new application at once, and soon the verb and verbal noun began to be used, and the sense of moving an airplane about on the ground came into being. Up to this time there was no acceptable word to describe the movement now referred to as taxiing. Some people called it *rolling*, others *S-ing*, and others *waltzing* in reference to the alternate side movements made in planes when the pilot could not see the ground straight ahead. But these words had no great appeal. When the word *taxiing* came along, it seemed to fill the need. It was quickly adopted by all the flying schools, dropped its derogatory connotation, and within a few months it became standard English. I have talked with a few of the old-timers who were flying in this period and have corresponded with others. All of them had used the word *taxi* as early as they could remember, but none of them could explain how the word got its start. It was only after examples of usage had been collected that the story became clear. The critical evidence appears in issues of *Aeroplane* and *Flight* between June and December 1911.

Thus the word *taxi* developed a new sense under the normal disciplines of the language without outside interference. This word's history shows a pattern of growth that can be found in countless other words and expressions. Without these patterns available, the language would soon stultify, regardless of what might be done by an official body's arbitrarily deciding what ought to be done. The tendencies that underlie the direction taken in word formations and meanings are very strong, and a control body that tries to set them aside is bound to have its difficulties. The better course is to accept the tendencies in the language, perhaps give a tendency a boost now and then, but never try to go against it. If this approach had been followed, we would probably have avoided some present plights.

There are, of course, many examples of "standardizing" that have gone awry. Some of us remember the suggestion offered in the Air Force to require us all to use the term *pilotless aircraft* instead of *guided missile*. It was believed that this would be advantageous

to the Air Force in the interservice rivalries. The drawback was that *pilotless aircraft* already had a naturally assigned meaning as applied to a drone or to any other aircraft flown under remote control. Had this suggestion been adopted, the purpose behind it would have been transparent, and we would only have deceived ourselves.

But there have been other misconceived definitions that have had official sanction. For example, the word *acceleration* was "standardized" in a pamphlet (AFP 11-1-4) of October 1959, the definition reading "the rate of increase of velocity." The same pamphlet defined *deceleration* as "negative acceleration (slowing down)." It was thus decreed that *acceleration* and *deceleration* would be used in opposite senses, and this was expected to "cause communications in this area to be more effective." The trouble was that the definitions offered were not in harmony with already established usage. In the first place, the word *acceleration* also meant something else than a *rate*; it meant velocity increase, whatever its rate might be. For example, we may say, "We felt acceleration, but we did not know its rate." You don't feel a rate, you feel something that impinges upon your senses, in this case a force called acceleration. In the second place, the definition did not take into account those situations in which the word *acceleration* applies either to velocity increase or to velocity decrease, or to both at the same time. These situations are common in the Air Force, as expressed in terms like *acceleration error, acceleration tolerance,* and *acceleration effects.* In an airplane, a human body has a tolerance for so much acceleration, expressed in g's, regardless of whether the velocity is increasing or decreasing. Thus the definition decreed was out of harmony with common usage and was bound to be ineffective.

I called attention to the futility of "standardizing" *acceleration,* and the "standardized" entry was subsequently dropped. Perhaps it would have been dropped anyway. Nevertheless, a later manual "standardized" the definitions of several other words in the same category, and these too have proved ineffective wherever they are defined contrary to common usage. These are words that stand for phenomena in the universe. Such words acquire their meanings in terms of nature or in terms of our understanding of nature. It lies outside the province of a military body to decree standardized definitions for words like *ablation, agravic, albedo, antigravity, aphelion, boron hydride, coriolis effect, cosmos, cryogenic liquid, ebullism, ecosphere, galaxy, nuclear fuel,* and *perturbation.* Yet these are just a few of the scientific words that are given "standardized" definitions by one of our manuals (AFM 11-1). If these definitions were always in harmony with usage, no great harm would be done by including them in a glossary that prescribes meaning, but this is demonstrably not always the case.

The part that usage plays is clear enough to everyone in respect to words and phrases used in science and technology. Not so clear, however, is why it is assumed that usage can be set aside or ignored in respect to words and phrases used chiefly within the military services. The fact is, of course, that usage does exercise its influence within the services too. This is why it is possible to label a given "standardized" definition as incorrect because it is incorrect in terms of usage. Usage becomes the standard of reference.

This fact invalidates the whole procedure of "standardization" by means of a committee or by coordination procedure consisting of a head count within a staff. A more effective approach is open to us. The first step is to find out what usage is and give a warm welcome to multiple meanings wherever they occur. In this process, guidance becomes simply the presentation of the facts of usage. Then let the user himself decide what words he wants to use. If guidance takes on the form of prescribing definitions, this must be limited to those situations where enforcement is possible.

Several persons have given consideration to this problem of arbitrary definition control. The following principles that have evolved seem to me sound. I do not pretend that these principles cannot be added to, but they show the kind of approach that has a chance of being effective.

(1) Any term that stands for a weight or

measure can be and ought to be standardized in meaning for operational use. In the United States the logical authority for doing this is the National Bureau of Standards. But even so, it is necessary to know that the jurisdiction of the National Bureau of Standards does not extend to other countries nor, indeed, to all parts of the United States necessarily. Consequently, in international use and in some domestic use, one cannot avoid different definitions for weight and measure words. Until July 1959 the word *yard,* for example, did not have the same meaning in Great Britain and the United States. And even after the two countries got together and agreed to a single definition in terms of the metric system, the word *yard* still means different things in the technical literature written before the agreement took place, as well as in applications to physical plants already built under the previous standards. The gauge of a railroad, for instance, if expressed in feet and inches, continues to mean different things in the two countries, except as the rolling stock and tracks have physically been changed to conform to the new standard. Likewise, for those fabricators who have not retooled to the new standards, the words *inch, foot,* and *yard* continue to have different meanings in the two countries, and also, for that matter, in the same country. The advantages of arbitrarily defining a weight or measure word are obvious, but it must be recognized that standardization, even in an area under some control, is not easy to accomplish. Accurate communication still depends upon knowledge and understanding as much as it does upon training to use a term in a certain way. If we think we have accomplished standardization by merely publishing a manual, we only deceive ourselves.

(2) Catalog terms can be arbitrarily standardized, and of course they ought to be standardized. This may best be accomplished by adopting a system of numbers or letters, providing within the system for new developments and growth. Common words can sometimes be mixed into the system, but the use of common English words can also lead to ambiguity and should not be attempted except to a limited extent under well-controlled conditions. Catalog terms can also be assigned electronic signals that can be integrated into a stock control and distribution system.

(3) Code symbols, by definition, are standardized. These have their application in visual communication, electronic communication, cryptanalysis, computing machines, cybernetics, photoelectric sorters, and many other ways. Any quantitative value can be assigned a symbol, as in mathematics, and communication thereby can be exact. Likewise ideas or concepts can be assigned symbols—as indeed they already are with words—and these symbols may be thought through so as to keep them under workable control. If the symbols are new, they can be made, for a time at least, to stay put and apply only to the ideas assigned. But symbols applied to ideas or concepts are subject to change as the ideas or concepts connected with them change, and in time they begin to act like other words, for indeed they are words. A set of electrical impulses, for example, can arbitrarily be made to stand for a concept. The concept, however, has meaning only in the mind of a person, and if the concept stimulated by the symbol changes in any way the symbol takes on a change in meaning. Hence the set of electrical impulses assigned either to a word or a concept may come to stand for a different concept than the one originally assigned. Of course there are large areas where movement in meaning is very slow, and for practical purposes in these areas the symbols assigned to concepts can be expected to remain stable.

(4) Coined words are more subject to arbitrary control than already established words. Coined words are, in effect, new symbols. Not having any history, a coined word has no connotations except those adhering to the elements from which it is coined or those that may come to it from associating the sound of the new word with some word already known. With a fresh start, a coined word can be assigned an arbitrary meaning, and its meaning usually stays stable. Words like *neutron* and *neutrino* are coined words that, for a time at least, can be kept under control by those applying them to precise concepts. Such words, of course, are subject to arbitrary definitions,

especially by those who first use them. But even these may drift slightly until such time as they are stabilized through accepted usage. At this point a control body can no longer effectively assign an arbitrary meaning without first taking usage into account. Then the process of defining becomes one of discovering the meaning and describing it, not "standardizing" it.

(5) If "standardized" definitions are to be prescribed, the fewer the better. The disciplines that inhere naturally within language are far more effective in terminology control than are arbitrary decisions made by an agency administratively or legally authorized to write "standardized" definitions.

(6) Persons undertaking to write "standardized" definitions should themselves be students of the language with background sufficient to detect the pitfalls of their precarious undertaking.

So much for "standardized" definitions. The alternative to them is our own understanding, helped perhaps by a general or a specialized dictionary. One has only to listen to a four-year-old child to realize how reliable a person's understanding of words can be. That child has not yet been to school, nor is he aware of the deeper complexities of the society in which he lives. But he has already mastered the basic principles that govern his native tongue. As he grows older he commands a larger and larger vocabulary that keeps pace with his expanding interests. Then he probably discovers the dictionary, and with a little effort he makes the dictionary work for him.

The dictionary maker has not pretended to prescribe usage, but he has provided a means for rapidly finding out what words mean in a great variety of contexts. The process is one of analysis and description. In this process the dictionary maker distinguishes between the parts of speech, but he relates these to a certain structure that he has observed throughout the language. This makes it possible to show interrelationships, as between words and the disciplines employed in using them, and as between the words and the concepts that lie behind them. With this structure to help him, he can hang even the smallest linguistic detail upon a twig or branch that is integral to the entire structure. This dictionary maker does not take sides; he never tries to subvert words to mean something they do not mean or to make them serve an ulterior purpose. His job is to describe and to relate his descriptions to the structure of the language. He is himself under the disciplines of the language. He sets forth the spellings of words, not because he likes them spelled that way but because he finds them spelled that way. He also sets forth the varied meanings, not because he has invented these meanings but because he has found them in use. Sometimes he points out the comparative frequency of a term, but he relies upon his collected body of evidence to help him exercise this judgment. He also distinguishes, if he is doing a complete job, between levels of usage, and again he does this by reference to his evidence. Words that are slang, literary, colloquial, or dialectal are distinguished for what they are. If the dictionary maker fails to point these out, to that extent he does not do his job. He also takes note of scientific and technical usage and marks this when necessary. He provides a history for certain words so that the user can understand how they came to mean what they mean. He treats of the origin or etymology of words and relates these to the cognates in other languages so that the user can obtain a feeling for connotations. He stages his whole presentation to show the language as used by living persons in a changing world. He does not sponsor changes, but he finds ways of showing the trends and developments that are taking place. He makes mistakes, but these are few and correctable if he has based his effort on evidence.

Members of government, as well as all other members of the community, can advance their interests by exploiting the work done by these dictionary makers. But this is not enough. Everyone must also study words and phrases in context, as used both by himself and by those about him. Variations in meaning are

countless, and words are subtle things. Those who are clever in their use can often impose upon a listener without the listener becoming particularly aware of what is going on. There is no substitute for close attention. The foundation for this attention is knowledge of the issues involved, knowledge of the contesting forces at play, and knowledge of word usage.

I NOW WISH to turn attention to certain words and phrases that crop up from time to time, used to influence policy and strategy. Sometimes their sponsors attempt to foist them upon people in government and get them prescribed for official use with specially loaded definitions. But as often as not they are directed at the public as a part of a campaign to obtain support for some general or special program. At first they may be used without ultimate design, but as reactions among listeners are observed they may become a part of a vocabulary intended to promote a particular position. A control body in government can well be alert to these kinds of words and leave them strictly alone or point out their tendencies. Under most conditions the normal processes of usage will dispose of them in one way or another, but sometimes, if they are adopted by an official body, their use can grow to the detriment of objective analysis of issues.

An example of such usage is *massive retaliation.* This term is sometimes credited to Secretary of State John Foster Dulles in a speech delivered on 12 January 1954 to the Council of Foreign Relations in New York City. It seems, however, that Secretary Dulles did not use this exact phrase in the speech, and what he did say is distorted in what has come to be the interpretation of the phrase. What he did say was as follows:

> We want for ourselves and for others a maximum deterrent at bearable cost.
>
> Local defense will always be important. But there is no local defense which alone will contain the mighty land power of the Communist world. Local defense must be reinforced by the further deterrent of massive retaliatory power.

Within a short time the words of the Secretary were interpreted in the press, as well as by many military people, to signify a policy that would rely almost wholly upon aircraft to defend the free world. This view was given credence by the actual buildup of the strategic air arm and by a program of stockpiling nuclear weapons.

It is not my purpose to explain, even if I could, the strategy that was actually meant or the strategy that actually evolved. But I do observe that the Air Force came to have an important part in the strategy and soon was identified in the popular mind with the phrase *massive retaliation.* The phrase became a trap. Opponents of the idea interpreted the phrase to signify a certain recklessness, a readiness to use nuclear weapons where conventional weapons could do the job just as well, a callous disregard for the destruction of enemy cities, and a willingness to narrow down our arsenal so that small wars and subversive activities could be dealt with only by using massive methods. It was also pointed out that a doctrine of massive retaliation crowded the enemy into positions that in some circumstances could precipitate war rather than prevent it.

At the same time that *massive retaliation* was being interpreted in this manner and becoming a kind of erroneous label for the Air Force's position, certain other terms, although not necessarily coined for the purpose, were introduced into the debate and lent themselves to the same effects. One of these was *limited warfare.* This phrase was sometimes used as an opposite of *nuclear warfare,* although in logic it could apply to any war, nuclear or not, in which an all-out effort is not made—that is, warfare limited in geographical spread, in the number of participants, in the choice of weapons, in the commitment of resources, etc. In context, however, the phrase was often used to suggest something almost pleasant—something indeed that would be less than war. As used, it made out that a war could be fought (as of course it can be) without massive attacks, even without aircraft, and that a strategy aimed at settling disputes by means of such mild wars is preferable to its opposite, an

unlimited or nuclear war. Thus the term came to be one of persuasion and self-deception.

Another appellative effectively used to suggest the same strategy was *brushfire war.* This phrase suggests that the strategy of meeting Communist aggression can be carried out by small, inexpensive fire-fighting units. It takes attention off the need for the backup power that forces the Communists to a strategy of such relatively small engagements.

Another term was *finite deterrence position.* This concept is defined in a RAND study as "the advocacy of a deterrence-only posture that relies on a highly invulnerable retaliatory force to achieve passive deterrence." It appeals to some persons because it suggests a simple way out. Obtain an invulnerable retaliatory force, and deterrence will follow. Then apply the term to a particular force, and those who object to the particular force can be labeled as advocates of an *infinite* deterrence position. This places the argument on the basis of costs. The *finite* position has a ceiling, whereas the *infinite* position becomes prohibitively costly. Thus the particular force being advocated becomes alternatively attractive.

These terms are noted because they illustrate what words are sometimes used for. In certain contexts they are appropriate enough, and no one can object to them when they advance the interests of sound analysis and make distinctions where distinctions must be made. But in other contexts they become the means of introducing misconceptions and irrelevancies and bring ulterior motives into the picture.

In our democracy, military men do not wholly determine our military strategy. They contribute, but so do others. The President establishes policies and helps shape strategy; Congress appropriates the funds; and the public elects both the President and the Congress. In the last analysis, the public has a voice in the kinds of war that we get into and the kinds of weapons we use. A part of the public is pacifistic, looking for the easy ways out for survival against a persistent enemy. Members of this group, like the rest of us, are influenced by the way words are used and defined, and they ultimately have an effect upon appropriations. To them a *limited war* is preferable to a *war;* a *counterinsurgency* action is preferable to a *limited war.* These terms take the attention off the issues at stake, which might, on some occasions, be vital enough to justify a general war; instead they put the attention upon size: the smaller the war the better, regardless of the stakes. Thus these terms are latched onto by a certain segment of the public and used to influence the outcome of appropriations and hence of strategy.*

The United States has, for the most part, been a peace-loving country, but there has sometimes been a willingness by us to dress up our motives more virtuously than the record seems to warrant. Our Indian wars, Mexican war, and Civil War, for example, all have had righteous explanations. And now that we are engaged in a power struggle with Communism we seek to justify ourselves where no justification is really called for. We call what we are doing *defensive.* To harp upon this aspect of the struggle is to breed a defensive psychology. Our military establishment is called the Department of Defense. We have a North American Air Defense (NorAD) and a Continental Air Defense (ConAD). We have point defenses and area defenses—illusive terms when you consider the offensive readiness required to put teeth into these so-called defenses. The word *counter* also signifies the same psychology, as in *counterstrike, counterforce, countervalue strike,* and *counterinsurgency.* Other words, such as *second-strike* and *response,* also reflect or lend themselves to a defensive psychology.

There is nothing wrong with these words for purposes of analysis, but as repeated in the literature they become words of persuasion, helping to structure our posture. This posture

*The philosopher William James in 1910 published his essay "The Moral Equivalent of War," in which he diagnosed the psychology of the pacifist and military parties. Although himself of the antimilitarist party, he took the pacifists to task for the arguments they usually advanced. These arguments boil down to the proposition that war is expensive and horrible. Pacifists, he wrote, seek an "ease-economy" in a world that lives by a "pain-and-fear economy." This essay was first published as Leaflet No. 27 by the American Association for International Conciliation. It has been reprinted several times, as in *McClure's Magazine* (August 1910), *Popular Science Monthly* (October 1910), and *Essays on Faith and Morals* by William James (New York: Longmans, Green and Co., 1943), pp. 311-328.

tends to be thought of more and more as defensive, automatically restricting us in the very selection of military and other choices, compartmentalizing our outlooks. It is possible that national survival and freedom require a strategy formulated neither in terms of the offensive nor of the defensive but simply a strategy that will employ all the instruments of national power in whatever way each evolving circumstance calls for. If this is the case, words suggestive of the larger strategy would go far in dispelling the defensive psychology of the Nation.

Then there is the word *controlled* that crops up all about us. It places attention upon the prerogative of decision-making and takes attention off the soundness or unsoundness of the strategy. It suggests that a threat of *uncontrolled* operations exists, instead of assuming that coordination and guidance through the chain of command will be observed in applying the particular level of force considered required. Obviously the conditions of command must be observed. But it is possible to maintain perfect control, decisionwise, and still have poor decisions and ineffective strategy. Thus the word is a diversion. It is used in such phrases as *controlled war, controlled reprisal, controlled response,* etc.*

These words appeal to the half-persuaded and the half-committed. From a political standpoint, they may, or must, be used to obtain the votes required for national and free world survival. But as words freely used by those who are fully persuaded, they can induce an erroneous appraisal of the kind of struggle that we are engaged in.

Persons responsible for providing guidance in word selection may well take recognition of these expressions that divert attention and mislead. Then they can call attention to words that denote reality. Many persons in government prefer to speak, for example, of *arms reduction* or *arms control* instead of *disarmament*. To find ways for a relative arms reduction is a different problem from disarming one nation after another. Is it possible that the very use of the word *disarmament* has helped set the goal beyond the reach of statesmen?

A good example of the realistic term and its power to influence events was the use of the word *parochial* by President Eisenhower on 2 February 1955. He used it to describe the responsibilities of the Army's Chief of Staff, and he scored a psychological point. He sent people scurrying to their dictionaries to find out what he meant. Most people thought they already knew vaguely—something about a church or a religious school. But this did not fit the context. President Eisenhower used the word to mean limited in scope, narrow. This meaning was generally unfamiliar to Americans, even though persons like Ralph Waldo Emerson and James Russell Lowell had used it that way. But Emerson and Lowell were hardly popular authors in 1955. It took the President of the United States to drive home the unfamiliar meaning and make his point. Once he had used the word, the very trouble taken by others to find out what he meant emphasized the point he was making. When commentators and government officials picked up the word, the impact was greater than ever. By using this particular word the President had helped explain a national strategy, and by explaining it with this word he touched the heart of the military controversy.

In contrast with this success, President Eisenhower once attempted to discourage the use of the term *cold war* and got nowhere. In a news conference of 29 June 1955 he said, "Let's stop talking about cold war. We are trying to wage a war for peace." Of course the President had in mind the idea more than the words. If he could rid us of the words, however, he might take attention off the idea. But the response was negative. The attempt was unrealistic, because the cold war was real. "War for peace" was no substitute. In fact, it was a slogan. Even if the President had issued an order against using "cold war," people could not have followed his order. Those who might have tried would have struggled to find a substitute word or phrase for the same con-

*In this context, the word *controlled* means directly responsive to the highest authority, whereby the effects and risks involved in any action can be assessed in terms of over-all considerations, including the options of using other instruments of national power, such as the diplomatic and economic.

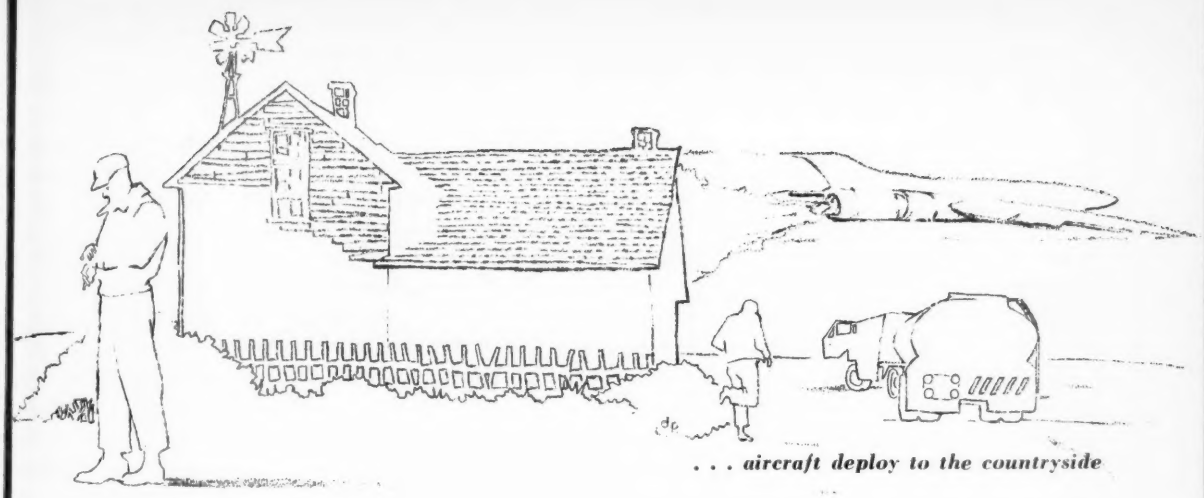
cept. So the effort would have come to no effective end.*

IT IS CLEAR, I believe, that terminology control is not a simple undertaking. If undertaken, it should be the work of persons acquainted not only with the issues at stake but also with the possibilities offered by the language. It is a matter of feasibility. The control exercised should be more guidance than prescription. Analysis of words and phrases as they appear in the dialogue may always be made, but analysis is usually far enough to take it. In some areas we can be arbitrary, but in most it is far sounder to rely upon the natural disciplines within the language itself than upon committees to rearrange the phrasing and patterns that are shared by millions of people. Language has its own principles that standardize meanings. Left alone, these principles usually provide ways of avoiding ambiguity. Tampered with or improved upon, they usually produce confusion and absurdities.

Language is at the very core of our search for truth. Without it, we might still be classed by the anthropologists as belonging to the order of Primates but not to the species of Homo sapiens. Our aim should be to make language serve us. This is done by letting it live—*live* in the sense of keeping pace with our needs and aspirations.

Aerospace Studies Institute

*The expression *cold war* was already well established before the Eisenhower administration. It goes back at least to 11 March 1946, when it appeared in the Baltimore *Sun*, and probably to an earlier time even before World War II, for Walter Lippmann is reported as claiming that it was first used in French—*la guerre froide*. To uproot such a well-accepted expression could not have taken place unless the concept behind it had died and withered away.



. . . aircraft deploy to the countryside

WE CAN WIN A NUCLEAR WAR

COLONEL ALBERT P. SIGHTS, JR.

DEFEAT will surely come to those who think they cannot win. A growing awareness of the latent destructive power in the world's nuclear arsenal has led some people into attitudes of despair and defeatism.* Seeing no hope of victory, they dismiss the problems of nuclear war as insoluble and confine their thinking to those of limited war, which seem more susceptible of solution. They assume that nuclear weapons will not be used, and they may be right. But the refuge their premise offers is uncertain and must remain so as long as such weapons exist. Nuclear war could occur at any time, and if it does the key to victory will not be found in plans and postures for lesser, more agreeable conflicts.

A nation rightly demands no less of its leaders than plans for winning all armed conflicts, including nuclear ones. True a government may elect to stop short of victory, but its armed forces must be prepared nonetheless to go the full distance if required. We cannot linger nostalgically over what war used to be or wishfully over what it ought to be. We must accept the possibility of nuclear conflict, try to visualize its probable nature, then decide what forms of military power, employed in what manner, will most surely overcome the enemy. With victory as our goal, let us then undertake such an analysis, looking first at the nuclear weapon itself, without which, of course, there would be no nuclear war.

The great, the unique characteristic of the nuclear weapon is its tremendous destructive power. A single one-megaton weapon will cause severe blast damage to frame buildings over five miles from the point of detonation.* Weapons of this size could neutralize or totally destroy most of the ports, airfields, and troop concentrations normally regarded as suitable targets for attack. Nevertheless much larger

*The following statement is typical: "Against a nuclearly well-armed opponent there is, of course, little chance of the classical military 'win.' Military doctrine must come to reflect the contingent status of military objectives, the willingness to settle for stalemate, implied by this fact."—Thomas E. Phipps, "The Case for Deterrence," *Current History*, 42 (May 1962), 280.

*Twenty-nine thousand feet according to U.S. Atomic Energy Commission, *The Effects of Nuclear Weapons* (Washington: U.S. Government Printing Office, 1962), p. 172.

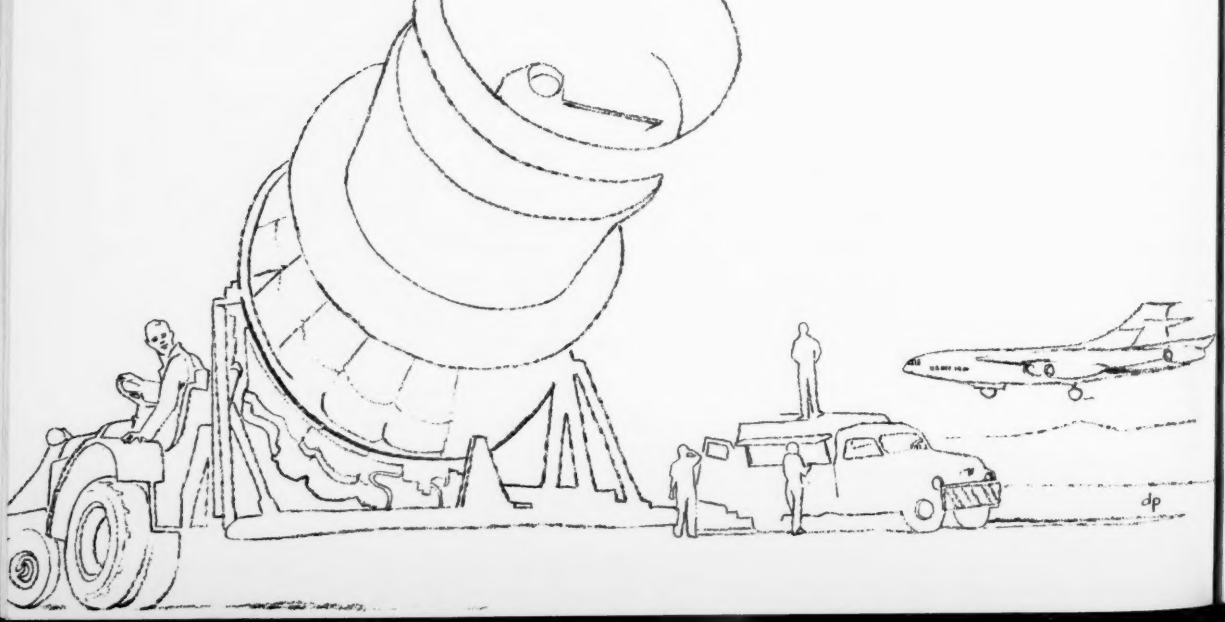
weapons now exist, and still larger ones may well appear in the future. If an enemy should attack our urban areas, he could devastate almost any city in the United States with a single nuclear blast. Equivalent destruction with conventional weapons would require hundreds of bombers and thousands of bombs. The significant fact to be noted is simply that one nuclear weapon can assuredly destroy one target even though the target be of durable material and of quite large dimensions.

On the other hand, the radius of effects of a nuclear explosion, though very great indeed, is by no means infinite. A bomb that wiped out a missile site might cause no damage at all to an airfield some distance away. Therefore, in spite of their great power, atomic weapons must be delivered with some degree of precision at selected locations in order to serve a useful military purpose. The military commander cannot just lob these weapons willy-nilly in the general direction of his enemy. He must have specific targets in mind, and he must know where they are located. In short, one nuclear explosion can destroy any concentration of men, equipment, and facilities comprising a military target, but the weapon must be delivered with reasonable accuracy on that target. The reader may feel this proposition expresses an elementary, self-evident truth. It does that and more. It reveals an approach to victory in nuclear war.

WHEN two nations confront each other in a nuclear conflict, each presents the other with a great number and variety of concentrations of people and things that might be considered profitable military targets. In the defensive role each nation will seek to shelter, conceal, and defend its most vital concentrations and, insofar as possible, to increase their numbers and decrease their sizes. In offense each nation will try to determine those hostile concentrations whose loss would most seriously weaken the opposing military power and find the means of locating and destroying them. It is important to remember that both sides will be engaged simultaneously in striking nuclear blows and in minimizing their own vulnerabilities to the opponent's nuclear strikes.

Consider now the situation at the very beginning of a nuclear war. Each opposing nation or alliance has large stocks of nuclear weapons, concealed and sheltered against at-

. . . efficient use of every resource



tack. Each side has substantial numbers of airplanes and missiles for delivering these weapons. Each side has extensive but incomplete, and in some cases erroneous, information on profitable targets in his enemy's territory. And each side has complex air defense systems whose capabilities, great or small, must remain largely unknown until they are put to the test of war.

The opening action normally expected is an attack followed in short order by a counterattack. Since U.S. policy statements indicate that we will not strike the first blow, the enemy would probably make the attack and we the counterattack. In the new language of the atomic era, the attack is called a "first strike" and the counterattack a "second strike." We might note in passing the present tendency to concentrate attention solely on these first and second strikes. Little or nothing is said about the 3d and 4th strikes, much less the 13th and 14th or the 103d and 104th. More on this later, but first let us consider the initial attack and counterattack.

The aggressor would launch a coordinated air and missile attack against our air and missile bases and perhaps against other targets as well. Before his bombs and warheads detonate, we could expect two things to happen. First, the aircraft and missiles comprising our defensive forces would oppose the attack to the extent of their capabilities. Second, the alert aircraft of our offensive forces would take off to strike targets in enemy territory, and these alert forces would be followed presently by an unknown but hopefully large number of missiles and additional aircraft still operable after the enemy's first weapons have detonated. Here we have the attack and counterattack, the first and second strikes, or what is commonly referred to as the initial nuclear exchange. It is an operation of bewildering complexity in technical details of execution but of classic simplicity in concept.

At this point the clear outlines of the picture disappear in a kaleidoscopic confusion of indeterminate facts and widely divergent opinions. At one extreme are those who believe the war would be over, with the loser prostrate and impotent. Heads of the opposing states would discuss the situation sensibly, agree on a truce, and call a halt to further destruction. At the other extreme are those who visualize a tapering off of the air and missile battle and a concurrent shift to large-scale land, sea, and air operations in the general pattern of World War II. Armies would mobilize, navies would struggle for control of the seas, and vast air and sea armadas would be assembled to project and sustain major land offensives in overseas areas.

As in most controversies, the truth probably lies somewhere between the two extremes. Whether hostilities would continue for two days or two years is a question we cannot settle by debate. Only war itself can give us the answer. But perhaps there is one useful conclusion upon which all can agree. As long as the enemy can locate profitable military targets and attack them with nuclear weapons, we shall face an intolerable situation in which every passing moment threatens new, unimaginable disasters. If this is so, clearly the situation requires drastic alteration before we can proceed with any orderly planning and execution of other types of military operations. The manner in which the situation must be altered is readily apparent. We must deprive the enemy of his ability to employ nuclear weapons against us while at the same time ensuring the survival of a substantial residual nuclear-warfare capability on our side. In other words, we must create a condition of "atomic monopoly" in the sense that we alone can discover enemy targets and deliver nuclear weapons upon them. Once the enemy is exposed to recurrent catastrophes which he is powerless to prevent or counter, for all practical purposes the war is over and there can be no doubt that we have won.

The attainment of such an atomic monopoly, so obviously desirable, would appear infeasible were it necessary to discover and destroy every nuclear explosive device in the enemy's possession. Fortunately this is not necessary. A nuclear bomb or missile warhead has small utility unless it can be delivered accurately on a known target. Here lies the key to victory. Reflection on this simple fact permits us to sift through all the myriad courses of

action imaginable for various types of military forces and to isolate the one objective of transcendent importance in nuclear war. That objective is to gain command of the air.*

This may strike some as an exaggeration and oversimplification. If we did win the air battle, they reason, could not the enemy still win the war, for example by overrunning Europe, occupying the rimlands of Asia, and sweeping our ocean shipping from the seas? He could not accomplish such feats without overcoming the powerful armies and navies of the free world. But even should the enemy succeed in these ventures, his defeat in nuclear war would be ensured if we gained and held command of the air. Conversely, with all the land and sea forces the free world could muster, it would still face certain defeat if the enemy won the air battle.

He who can fly when his enemy cannot has exclusive access to detailed reconnaissance information. Without reconnaissance, a missile is blind and useless for employment against certain types of opposing forces that must be destroyed at all cost. With reconnaissance, missiles can be used to attack these vital military targets with a high probability of success. Once we gain command of the air, with all the exclusive reconnaissance and strike capabilities which this implies, hostile armies and navies will lie exposed to the crushing force of atomic onslaught while our own surface forces operate with relative immunity behind a curtain of secrecy.

If command of the air must in any case be won, it is better won sooner than later in nuclear war. The longer the air battle continues, the greater will be the destruction inflicted on both sides. This indicates a requirement at the very outset of hostilities for a heavy preponderance of superior air power, together with a complementary missile force of suitable size and character, and, equally important, an imaginative plan for using these forces to establish early an effective atomic monopoly. Two basic tasks are involved. First, we must destroy or neutralize the enemy's air force—not his cities, people, and factories, nor even his ground divisions and naval fleets. These latter military forces can await their turn and, if the need arises, receive their full share of attention after the issue is decided in the air. Second, we must see that our own air forces survive in great strength to apply whatever additional offensive power might be required.

How can we destroy the enemy's air force? We can seize and occupy the territory on which his air force is based. But this operation takes time, and time is critical. Every passing day, indeed every hour, would bring new possibilities of untold catastrophe. We must destroy the hostile air force quickly. A ground campaign extending over months or years plainly is not the answer. Only air power can do the job. But we cannot, as in earlier conventional air campaigns, fight a long-drawn-out battle of attrition, gradually whittling down the opposing air forces and ultimately wearing them out. Nuclear war demands a different approach: an aerial blitzkrieg of unprecedented power and efficiency, one that will overwhelm the enemy's air defenses and destroy his offensive air forces wherever they may be found. If we are to minimize the disastrous consequences of nuclear war, it is by no means sufficient to have air power that is only marginally superior. Voltaire once said, "God is always for the big battalions." The Western powers must be at least as superior in air battalions as the Communist nations reportedly are today in land battalions.

Can we build overwhelming air power? Some people believe we cannot match the Communist bloc man for man and gun for gun. This may be true insofar as ground forces are concerned. In any case it is neither necessary nor desirable to match the Communists in this form of military power, where they hold an evident advantage in geography as well as

*"To have command of the air means to be in a position to prevent the enemy from flying while retaining the ability to fly oneself."—Giulio Douhet, *The Command of the Air*, trans. by Dino Ferrari (New York: Coward-McCann, 1942), p. 24.
This 40-year-old definition is still serviceable if one simply interprets "air" as extending to whatever altitude or interplanetary distance is necessary to establish the desired position. Whether flying machines operate at 500 feet or 500 miles we shall, for simplicity in this discussion, call them airplanes. The word *aerospace* is intentionally avoided because of semantic difficulties in later discussion where the author wishes clearly to distinguish air forces (comprising airplanes) from missile forces, since these two are often lumped together under the generic term *aerospace forces.*

available manpower. Our strategy should be to exploit their weaknesses and our strengths. Above all it should focus on the peculiar requirements of nuclear war. Technological skill and industrial strength give the West the means to develop superior air power. If we cannot match the Communists soldier for soldier, we can surely match and surpass them airman for airman and airplane for airplane. This is the military potential on which to capitalize.

If we concentrate on building air power for the unlikely nuclear war, where will this leave us for the more probable conventional wars? Actually preponderant air power can be equally decisive in conventional war if it is used in a manner that forces a change in the pattern of war along lines most favorable to ourselves.* The maintenance of dual nuclear and conventional capabilities is much less troublesome to air forces than to some of the other types of military forces. Both capabilities are inherent in air forces, or they can be if we make them so. The more airplanes we acquire for nuclear war, the stronger we shall be in conventional war.

It may be said that the modern airplane is too expensive for mass production. Such an argument will have a familiar ring to those who recall how the P-36 and the B-17 were similarly categorized in the 1930's. Adolph Hitler showed us the error of that belief. Today, as in World War II, command of the air is the one essential ingredient of military victory. Those who regard the nuclear weapon as "our most effective weapon" are misinformed. The truth is that our most effective weapon in any kind of war, nuclear or conventional, is still the "airplane." We cannot afford *not* to build what it takes to win and win quickly in nuclear war.

GIVEN a position of superior air strength, which is the first essential, there remains the question of how air power is best employed. A superior air force does not of itself ensure victory. During the Battle of Britain the German Luftwaffe enjoyed a substantial numerical superiority and yet failed to achieve its objective of destroying the Royal Air Force. In *Operation Sea Lion,* Peter Fleming has described five British air defense radar stations which at that particular time "were (excepting perhaps the person of the Prime Minister) the most important objectives for German bombs which the island contained."* Yet after initial attacks which did limited damage, those conspicuous, vulnerable targets for unaccountable reasons were no longer visited by the Luftwaffe. Bombing attacks on sector stations used to control the RAF fighter squadrons were similarly discontinued at a time when further destruction of these vital facilities might have proved decisive. Hindsight reveals many similar errors or missed opportunities in the targeting policies of both Allied and Axis powers during World War II. We can ill afford such mistakes in nuclear war. Let us not forget that the success of an air campaign depends in great measure on the astuteness of target selection.

In nuclear war, the designation of times, places, numbers, and sizes of desired nuclear explosions gives direction and purpose to the air and missile offensive. Airfields, air defenses, and air control facilities represent target systems, among various others, that require early attention. The individual targets comprising such systems are numerous and scattered, many are strongly defended, and some are concealed or ill defined. The problem of locating and destroying them quickly involves many complexities and uncertainties. The task requires efficient use of every available resource. Objectives must be quite narrowly focused as compared with the broad spectrum of targets attacked at one time or another in World War II and the Korean War. Traditional targets such as marshaling yards, bridges, hydroelectric plants, oil refineries, and the like are unimportant in the first critical days of nuclear war when the situation de-

*For a suggestion as to how this might be done, see author's "Limited War for Unlimited Goals," *Air University Quarterly Review,* XIII, 3 (Spring 1962), 38-48.

*Peter Fleming, *Operation Sea Lion* (New York: Simon and Schuster, 1957), pp. 223-224. See also Denis Richards, *Royal Air Force* 1939-45, Vol. I, (London: Her Majesty's Stationery Office, 1953), chap. vi.

mands a single-minded concentration on eliminating the enemy's air force in-being.

Just as airfields will inevitably be high on our own list of target priorities, so will they likely be on the enemy's. This leads us to consideration of the second task of nuclear war, that of preserving our own air forces. As we have noted, only one nuclear explosion can neutralize or destroy an airfield. Except for aircraft carriers, which we shall consider later, the locations of virtually all our airfields now considered usable for military purposes are well known to the enemy. Airfields in known locations lie exposed to missile attack against which an assured defense is neither in existence nor in immediate prospect. And under present concepts of employment, military aircraft without airfields from which to operate are no longer effective instruments of war. Therefore, in nuclear war, we must somehow divorce airplanes from airfields.

Before dismissing this thought as technically infeasible or economically prohibitive, reconsider for a moment the period of first and second strikes in nuclear war. Authorities generally agree that the enemy will likely attack major airfields in his first strike because of the nuclear threat they present to him. With sufficient warning, however, our aircraft should be airborne before the airfields are struck. We may assume for a number of reasons that the initial strike would not wipe out all our usable airfields. For example, of ten air bases in a given area, only two or three might be destroyed. What should be done then about our aircraft when they return from the second strike? Realizing that one direct hit with a nuclear weapon would destroy every airplane on an airfield, should the air commander order his squadrons to land at bases where missiles might arrive at any moment? If so, will he not have to keep ground crews and supporting equipment on these bases to service the airplanes after they land? If he decides to accept the risk of total loss, how many of his remaining bases will survive, and for how long, when the enemy has made them high-priority targets and knows their precise location?

We are forced to conclude that an airfield, the traditional habitat of airplanes and crews, may become a forbidding spot of impending doom in nuclear war. Therefore, if we are to have a fighting air force after the second strike, it must of necessity be based on something other than airfields as we now know them. Military aircraft must deploy to and operate effectively from the countryside in widely dispersed locations until the enemy has been divested of his nuclear capability. In the early days of flying, the Army Air Corps frequently operated from unprepared fields, but it will be said this is no longer possible with modern, high-performance, "sophisticated" airplanes. Now there must be two miles of paved runway, acres of parking apron, elaborate refueling systems, and much electronic apparatus; also field lighting, jet starting units, scores of technicians, hangars, shops, warehouses of supplies, and all the other complex paraphernalia of a modern military air base. If these seemingly necessary things could be improvised or dispensed with, an air force might then disperse its aircraft to small towns and villages throughout the country. Could this be done? Apparently not. But could it be done if the only alternatives were destruction of our air force, loss of the air battle, and ultimate conquest by the enemy?

Faced with this bleak alternative, we begin to see other possibilities. Conceivably a supersonic combat aircraft might be landed intact on a predesignated stretch of highway. With well over two million miles of rural surfaced roads in the United States, surely there are more than a few such "airfields" ready today to receive military airplanes. Minor relocation of obstacles and widening of shoulders in selected areas should produce many more. Construction of new roads, particularly interstate highways, presents obvious opportunities for planned expansion of these emergency landing strips.

Assuming that one such potential airfield has been selected in a particular locality, what then? Citizens of a nearby town or village could play an important part in doing what must be done. For example, they could mark off the landing area, divert vehicular traffic, improvise field lighting, and install and operate simple navigation aids. They could guard

the airplane when it arrives and perhaps conceal or camouflage it, refuel it with the most suitable fuel available, and possibly even repair it. They could feed and house aircrew members, protect them from fallout if necessary, and put them in touch with a military headquarters for further orders. And they could assist teams of technical specialists from the nearest depot in rearming the airplane and otherwise preparing it for flight. If local citizens were organized, trained, and equipped for specific tasks, so much the better, but in any event they could do these things and many more. The American people would welcome the call and challenge to help their fighting forces in the struggle for national survival.

These potentialities for operating military air forces from the countryside with the aid of local citizens are by no means confined to the United States. Every country has them in some degree. Wherever airplanes might land in the free world, obstacles could somehow be overcome and the planes and their crews readied for another military mission. Operations might be inefficient, dangerous, and uncertain—fantastic even—but not impossible. The history of war abounds with examples of spectacular military successes resulting from brilliant improvisation against apparently insuperable odds. If air bases become untenable, air power must still survive. Therefore we must learn to operate our airplanes without air bases. In war, what must be done can be done.

Let us now consider the special case of the aircraft carrier, which is in effect a mobile airfield. Its ability to steam on random courses makes impossible the prediction of its exact location. As a result it is much less vulnerable to missile attack than the fixed airfield on land. Furthermore the carrier and its aircraft, together with accompanying ships of the fleet, can present a strong, well-knit, active defense against air and submarine attack. The utility and survivability of the aircraft carrier in conventional war have been amply demonstrated.

On the debit side the carrier is possibly the most compact and expensive package of military air power in existence today that could be lost in a single nuclear explosion. The increasing scope and effectiveness of aerial reconnaissance are progressively reducing the traditional capability of surface naval forces to hide in the vastness of the sea. Nuclear-propelled submarines pose an increasing threat, as does the trend toward development of very-high-yield nuclear weapons with their attenuated effects in underwater bursts.* These factors suggest that aircraft carriers might be seriously vulnerable, at least in those inshore areas where they can usefully engage enemy air power.

In nuclear war every usable military aircraft must be committed immediately to air battle and continued in operation by all conceivable expedients until command of the air is established. The risk of losing at one stroke the entire priceless aircraft complement of a carrier is one we cannot afford. Like their land-based counterparts, these airplanes must be dispersed. In view of the obvious advantages of operating from bases at sea, we should press for early development of high-performance vertical - takeoff - and - landing aircraft which, after appropriate ship modifications, might be dispersed from the carrier to all ships in the fleet. Thus in nuclear war every naval vessel would become a small emergency airfield able to recover airplanes and launch them on further combat missions. Pending such developments, however, it appears that our present carrier aircraft would best be deployed initially to the countryside in the manner previously suggested for land-based aircraft. We could then dispatch our large carriers to relatively safe havens, bringing them back into the conflict after atomic monopoly is achieved, whereupon naval forces would revert to conventional methods of employment.

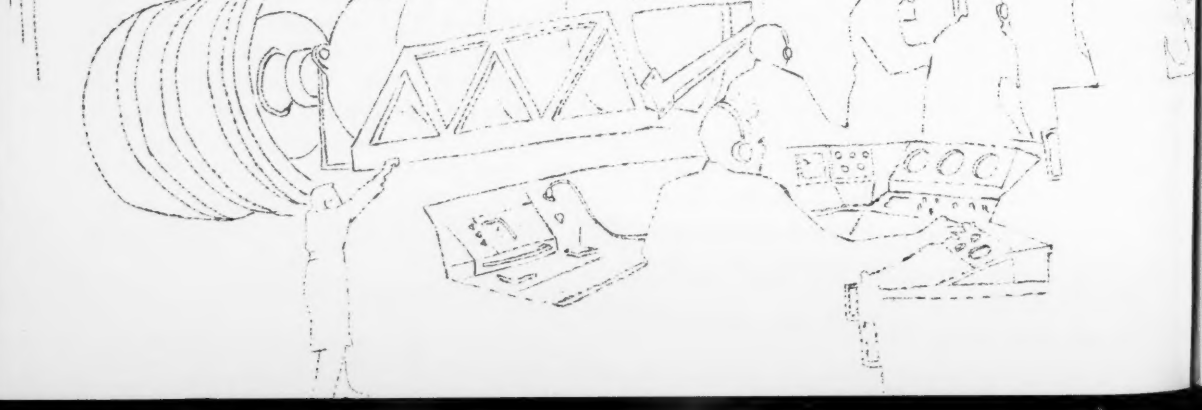
The real significance of the "missile age" is not that missiles are replacing airplanes, which they cannot do, but that air bases and aircraft carriers are becoming untenable for wartime operations. These bases will remain useful in peacetime and in those conventional war situations where resort to atomic weapons is unlikely. In nuclear war, however, they will become useless from the time we react to

*Effects and implications of underwater bursts are discussed by M. P. Gallois in "The Missile Submarine: Total or Partial Deterrent?" *Interavia*, Vol. XVII (May 1962), 570-572.

warning of impending attack until the enemy's nuclear delivery capability is destroyed or neutralized. Once our counterattack is under way, we must withdraw our aircraft carriers and complete the evacuation of our air bases. Essential supplies and equipment as well as all personnel must be physically removed from air bases before the commencement of hostilities or as soon thereafter as possible. We must base individual aircraft at every town and village in United States and allied territory where a suitable landing strip can be found or improvised. Future first-line airplanes may be able to take off and land vertically, but we cannot await this development. Such airplanes, though promising, may never match conventional ones in combat performance. If they do, dispersal on land and at sea will be easier. Even so, new concepts of command, control, support, and administration will still be needed.

How successfully we can fight from dispersed locations will depend on the planning, preparation, and rehearsal that precede an atomic onslaught. We must locate landing strips, modify highways, and earmark local sources of supply. Other steps might include activation of small reserve units in towns near the airstrips and design of simple vehicular mounted equipment like that used by soldiers in the field. With emphasis on simplicity, austerity, and improvisation, vast expenditures should not be necessary. In nuclear war much risk can be accepted, for peacetime safety standards need not apply. Granted that combat efficiency might be low and accident losses high, but let us not forget that a single surviving warplane can deliver on one sortie more explosive power than that of all bombs dropped in Europe by thousands of Allied aircraft during World War II. Or in reconnaissance, this same airplane can locate and mark for missile attack an enemy weapon poised to destroy our own largest city in a single blow. Two surviving airplanes would double these capabilities, a hundred might tip the scales toward victory in the air battle, and a thousand might constitute that overwhelming air power so urgently needed to bring an immediate decisive end to the nuclear war.

In the probable chaos of nuclear conflict, every surviving airplane will become a priceless and irreplaceable asset. If airplanes are dispersed and concealed on widely scattered, improvised bases throughout the free world, they will present to the enemy a target system he *must* destroy. Yet he *cannot* destroy it without extensive detailed aerial reconnaissance. To conduct this sort of reconnaissance, the enemy will require command of the air, which he cannot achieve so long as he faces a surviving air force substantially stronger than his.



. . . technological skill and industrial strength

At this point we should recognize that the enemy might well decide to disperse his own air force in the same manner. If so, he would surely confound those who fondly expect to win with a single massive counterattack, or second strike. Instead they will likely see unfolding an extended battle of attrition in which both sides, though able to destroy any known target, are thwarted by a target system ill defined and elusive. In the resultant contest of reconnaissance and strike capabilities the superior air force must inevitably prevail. The greater the imbalance in air power, the shorter the contest. Again it follows that the basic requirement for a quick, decisive victory in nuclear war is simply the possession of overwhelming air power.

IN THIS DISCUSSION we have not referred specifically to the deterrence of war, since our purpose was to find the means and methods of winning should deterrence fail. The two objectives of deterrence and victory are closely related, but they are not the same. An evident capability to defeat the enemy is the strongest form of deterrence. Yet, strangely enough, a great deal less attention has been paid to winning than to deterring war. At the root of this paradox is an apparent misconception of the relationship between diplomacy and force. In this world of sovereign nations diplomacy operates, reluctantly perhaps but inescapably, against a backdrop of military power. Astute diplomacy can advance the interests of a nation, but the ultimate deterrence of an implacable foe cannot be achieved with words alone. Interwoven with the eloquence and ingenuity of diplomatic language is the pervasive influence of latent capabilities to employ force. If and when the question of peace or war comes to rest solely or substantially on a raw balance of power, a fanatical enemy will be deterred only by military forces that are sufficient to the task.

What is a sufficiency of military power? The ability to inflict "unacceptable damage"? Perhaps. But this is a slender cord upon which to suspend the fate of a great nation. We should find infinitely more comfort in a capability to inflict certain defeat—to force any enemy, at any time, in any circumstance, to do our will. This has always been and will always be the ultimate purpose of military power. Such a capability is no guarantee of peace and security, but it represents the closest approach now available and could be the salvation of our country if deterrence fails.

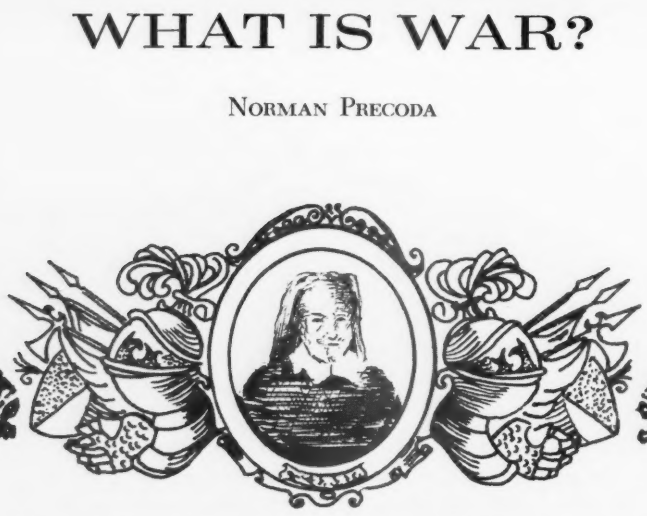
The question of whether to build great military power, though fundamental, is less difficult to answer than the question of how armed forces should be constituted. The selection of weapons and design of a force structure have never been easy tasks, nor have decisions been infallible, as witness the many blunders committed in preparing for past wars. These tasks are now vastly complicated by the multiplicity of new weapons and other military devices born in the unprecedented technological surge of this century. As the range of choice expands, so do the opportunities for error expand. In the face of conflicting claims, divergent concepts, rising costs, and budgetary constraints, the temptation is strong to buy a little of everything and, as a consequence, not much of anything—a convenient solution all too easily rationalized by the glib assertion that "it would be fatal to put our faith in one weapon or one concept."

True we need a variety of military forces to deal with enemy threats arising in different areas under various guises. But in conventional conflict we can lose many battles in many places; we can withdraw, regroup, and reconstitute forces and still come back ultimately to win. In nuclear conflict, on the other hand, we or "they" can lose the war in a single battle. Today only one military force can deliver the central decisive thrust to win this battle. That force is air power. If we build an air force large and strong enough to do the job, we shall have a sufficiency of military power. This is our best assurance that nuclear war will not occur.

Armed Forces Staff College

WHAT IS WAR?

NORMAN PRECODA



For Warre consisteth not in Battell onely, or in the act of fighting; but in a tract of time, wherein the Will to contend by Battell is sufficiently known: and therefore the notion of *Time* is to be considered in the nature of Warre, as it is in the nature of Foule Weather. For as the nature of Foule Weather lyeth not in a showre or two of rain, but in an inclination thereto of many dayes together: so the nature of Warre consisteth not in actual fighting, but in the known disposition thereto, during all the time there is no assurance to the contrary. All other time is *Peace*.

Thomas Hobbes, *The Leviathan*, 1651,
Part I, Chapter XIII

ONE OF THE most curious aspects of war is that, although it is one of the oldest of man's activities, although millions and millions of people have had first-hand, often heartbreaking experience with it, although nearly everyone at one time or another has expressed opinions on the subject, we seem to know little and misunderstand much about war. What is war? What causes it? When, how, and why does it begin and cease?

Our language has a large and ever growing vocabulary on the subject, or war jargon. But language is a double-edged tool. Even as we accept and exploit the use of language, we are at least to a degree prisoners of our own words and phrases, of our very vocabularies. That is to say, although language helps –perhaps even makes possible–the transmission and dissemination of ideas, the ideas themselves may be, and in fact often are, modified and even transmuted in the process. Where language is obscure, where the words and phrases are imprecise or ambiguous, communication becomes more uncertain, and already-difficult problems risk becoming still more intractable. The point needs particular emphasis today because of the rapid and widespread diffusion into the language of a growing jargon or vocabulary of war.

What is war?* I had occasion recently to discuss this question with a long-experienced and respected investigator in the field. He gave it as an opinion that war is organized conflict wherein on the order of 3000 or more are killed. Probably any definition is, willy-nilly, a subjective one, and although this particular definition gives rise to still further questions, it does have a certain clarity and, hence, perhaps a measure of utility. Passing lightly over the possible meanings and implications of "organized" and "organized conflict," one finds it difficult, nevertheless, to keep from questioning the fundamental meaning of any definition of war based on mere number. Surely, whether organized or unorganized, the number killed is hardly a very meaningful indicator. Why not 2900 people killed instead of 3000, or 1900, or 900, or 90? The definition is a subjective one, and since there appears to be no final arbiter, each such theorist would seem to be free to choose his own number or even another criterion. Relatively recent war history suggests, almost, that each has. Thus the 1950–1953 activities in Korea have been called a police action, regardless of the number of participants and the blood shed. The Marco Polo Bridge incident in July 1937 sparked hostilities that spread across China like a prairie grass fire in a strong wind. Within six weeks the Japanese had killed more than 200,000 civilian and military personnel and had indiscriminately bombed and destroyed Chinese cities. The Japanese leaders referred to the fighting in China as an "affair," not war. To them it was no more than a prolonged incident of a relatively minor nature.[1] Other examples might be cited to illustrate the variety of attitudes toward and definitions of war, as, for instance, Professor Quincy Wright's use of the term to indicate armed confrontation of at least 50,000 combatants, or Pierre Gallois' use of it to identify a state of conflict in the juridical sense of the word.[2] With all this the vocabulary of war has flourished; it continues to grow and change and spread, but the frequency and apparent popularity of many of the additions are not strong evidence of clearer and easier communication or of deeper and wider understanding of war.

*The United States Constitution, Article I, Section 8, Subsection 11, provides that Congress shall be empowered to declare war, a power which because war itself is undefined leaves the issue open to question and controversy.

The Spectrum Concept of War

According to an old Chinese proverb, the beginning of wisdom is to call things by their right names. Lord Kelvin, too, referred to something of the same idea in his famed observation on the fundamental importance of measurement. Hence in our discourse on war we shall begin at the beginning with a discussion of the contacts and interactions between nations, how they might be classified and named, and how ordered. After having established an organized view of exacerbated inter-

national relationships, we can expand the concept to include time. The resultant construct will not only accord reasonably with recorded history but also present that history, complex and chaotic though it may seem, in a manner more comprehensible and therefore more usable than otherwise. The construct helps to cast light on certain current and oncoming problems, some of which are pointed out and discussed.

We begin, broadly speaking, with international relations.

international relations

As perhaps with most human relationships, be they between individuals or groups of individuals, the visible interactions between nations may be likened to the above-water part of the iceberg. In both instances by far the greater and supporting part is beneath the surface. To illustrate something of the number and variety of above-the-surface and visible relationships between nations, a more or less representative list has been arranged in order of increasing exacerbation or embitterment. The visible relationships are but reflections or symptoms of the existence and presence of other and deeper interactions, of underlying tensions and antagonisms which create or cause the states of embitterment. Clearly any such list is, and perhaps can be, only partially complete, for it is easy to add many more examples, many more forms and gradations of enmity or embitterment. Because of the great variety of possible forms and the wide range of possible intensities, it is evident that the totality has the characteristics of a spectrum of events on the international scale. From this arises the basic concept of embitterment as a spectrum, a relativistic view of international relations as it is also of human affairs.

Embitterments between nations can thus be visualized as a kind of spectrum of international life. But since this particular spectrum is based on and represents what are deeply and intrinsically antagonistic or hostile relationships, it must of course be a subspectrum of a larger family containing both friendly and unfriendly actions. This gives rise to a further question. If each action or state of embitterment is but the visible symptom or result of a large and complexly related variety of underlying forces in international life—and surely this must be so—it may be asked whether it is possible to assemble an embitterment spectrum, a hostile or unfriendly activities spectrum, uncontaminated by "friendliness." It is difficult, in the deeper sense, to

International Relations
orders of exacerbation

1. no international contact - yesterday's separate local civilizations, each intent on its own affairs and going its own way
2. international exchanges - trade - laissez faire
3. preferential agreements - trade blocs - tariffs: credit-aid programs
4. economic influence - export/import controls - cartels
5. economic pressure - "dumping" - grants - pre-emptive purchase: Battle Act, Aswan Dam
6. economic, political penetration - intrigue - intimidation - preclusive actions: Suez restrictions, Rhineland reoccupation, Azerbaijan
7. political plus covert (material) aid - terrorism - coup d'état: Austrian, Nazis, Albania, Czechoslovakia, North Korea
8. fomenting and/or aiding civil war - internal forces given logistical and technical aid: Spain, Greece, Indochina, Vietnam
9. invasion by proxy - armed invasion: Abyssinia, Mongolia, South Korea, Tibet
10. direct invasion by major power - large power inequality: Poland, Finland, Hungary, Suez
11. major powers at war - limited objectives - less than all-out war: Crimean War, Russo-Japanese War, Changkufeng
12. major powers at war - general war - unlimited use of "conventional" weapons: World War I, II
13. major powers at war - general war - no restraints on methods or weapons

increasing international embitterment ——→

conceive of anything but a negative answer, for the very idea of a relativistic and spectrum view of international relationships implies the negative. Something of the same idea is quietly and beautifully expressed by George Kennan at the close of a discussion of Soviet foreign relations:

> The picture, then, which I hope I have presented is that of an international life in which not only is there nothing final in point of time, nothing not vulnerable to the law of change, but also nothing absolute in itself: a life in which there is no friendship without some element of antagonism; no enmity without some rudimentary community of interest; no benevolent intervention which is not also in part an injury; no act of recalcitrance, no seeming evil, from which —as Shakespeare put it—some "soul of goodness" may not be distilled.[3]

All this is to say that attempts to construct either a purely friendly or unfriendly spectrum are foredoomed. The accompanying figure is at best only an approximation, and it is presented in the belief that the intrinsic imprecision and error are outweighed by the usefulness of an organized view of what otherwise seem to be disconnected and chaotic events.

war spectrum

We can think of the different intensity levels as wavelengths in a kind of spectrum whose totality encompasses an infinite number and variety of forms and gradations of embitterment—even as there is an infinite number of sources, forms, and degrees of tension in the relationships between men and between nations.

War inevitably brings up the idea of peace. It is often felt that peace is a more or less neutral and passive state, but this is not so. It is not so at all. Following the Spanish scholar, diplomat, and writer, Salvador de Madariaga, we shall define peace as the free exercise of activities, by men and by nations, under the rules freely and generally acquiesced in. (Since, as Peregrine Worsthorne points out, theoretically everyone can interpret natural law—what rules are acceptable—differently and in his own interest, a workable consensus is most likely to exist, if at all, in a society where there is a sharing of basic religious and/or ethical principles. To the degree that members of a society do not agree upon or share fundamental determinant principles, tensions, antagonisms, and embitterment will be present, and peace will not be a possible state.)[4] Certainly this so grounded and bounded freedom is the only state that men will recognize as acceptable and therefore the only one that will not give rise to tensions, antagonism, and embitterment which sooner or later must lead to the rupture of outward apparent peace. Where there is no general consensus on acceptable rules or principles or where the area of agreement is so small as to be unworkable, there is no peace.

If we accept peace and war as complementary, it follows that where peace is not, there is war. The fact that unrest and violence do not break out does not prove peace, however. The presence of violence, that is, the resort to use of force, is a mere technicality, a judgment of the moment as to the most persuasive and effective means for settling the dispute. Relative quiet between nations may only mean that one side or the other is otherwise momentarily distracted or, perhaps, simply too weak to contest the issue. A world in which men, groups of men, or nations refrain from activities otherwise considered legitimate (conforming to rules freely and generally acquiesced in) is therefore not at peace. No matter the form, the action or inaction, no matter the presence or absence of violence, the state is that of war.*

The words "war" and "conflict" are often used indiscriminately, but the terms are not interchangeable. War is a subclass of conflict, which means that while war is conflict many conflicts are not war. Conflicts which stem from or are associated with activities carried on within the broad framework of mutually and freely acquiesced-in principles are not war and in fact may even be deemed very desirable—for example, the clash of forces in

*Since war is associated with and defined in terms of the basic attitudes and actions of men, it is clearly an intranational as well as international phenomenon. The common view of war as an action between nations is therefore, by this definition, a limited view, albeit perhaps a useful one.

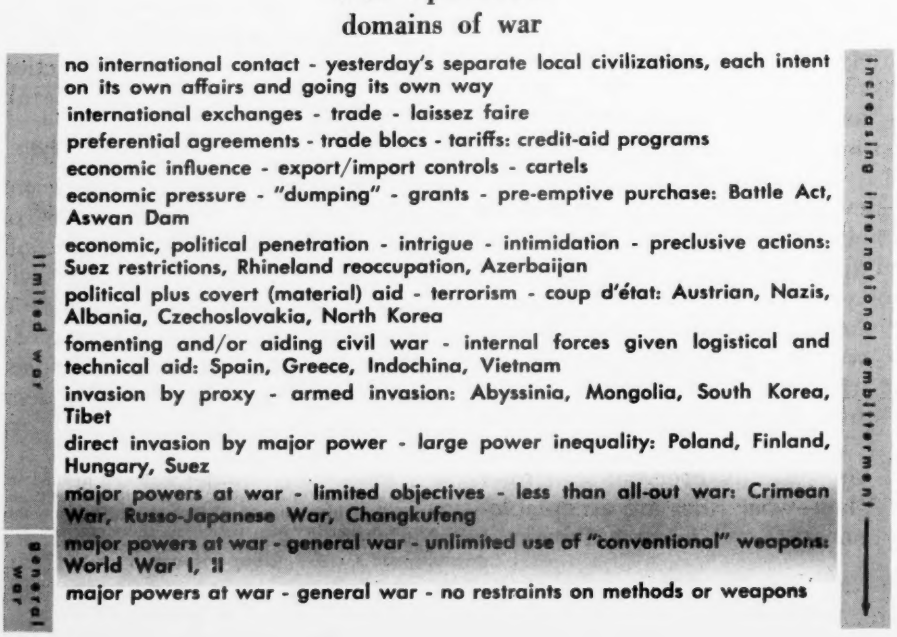
economic competition and in the realm of politics. This is to say that war is conflict which arises from a disagreement with regard to basic rules or principles of conduct and in which one group attempts to impose its views on another. It is interesting to note Mao Tse-tung's statement: "War is the highest form of struggle for settling contradictions between classes, between nations, between states and between political groups . . ."[5]

It is useful to comment on the means or measures (tools and techniques) which might be associated with each of the different levels of embitterment along the spectrum scale. Generally speaking, increasing embitterment is associated with increasingly persuasive means. At the far left, for example, one can envision that the means might be a visiting tourist, a bag of rice or a bale of cotton, technical and economic assistance, a military advisory group, material aid coupled with politico-military pressure, and so on, the means becoming more and more "persuasive" going up the scale. Each new and higher level of embitterment uses or permits to be used new and more effective (persuasive) means than were used up to that point. The list of available and usable means is cumulative in that, at any given embitterment level, any or all means associated with lower levels may be used. Thus during World War II when the highest level actions were far up the scale, the war was also simultaneously pursued far down the scale. A case in point: efforts by the Western Allies to pre-empt by purchase Sweden's ball-bearing manufactures and wolfram from Spain and Portugal. (Some of the difficulties in carrying on multiwavelength actions were experienced, too, in that Western efforts to outbid Germany led to skyrocketing prices in Spain; prices were controlled in Portugal but allotments were made to both sides; in Sweden the pressure of demand led to expanding production capability to satisfy both sides.)

domains of war

It is useful though risky when confronted with problems of great size and complexity to attempt to break the whole into smaller and more manageable parts. It is useful because smaller parts can more readily be comprehended, and risky because the associated simplifying assumptions introduce errors. The decision to subdivide and separately examine the

War Spectrum
domains of war


limited war
general war
no international contact - yesterday's separate local civilizations, each intent on its own affairs and going its own way
international exchanges - trade - laissez faire
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major powers at war - general war - no restraints on methods or weapons
increasing international embitterment

smaller parts usually rests on the premise that the disadvantages resulting from the added imprecision and error are outweighed by the benefits derived from deeper insight into the total problem. The accompanying figure presents a generally workable division of the war spectrum.

The very concept of a spectrum suggests that attempts to classify and then draw lines of demarcation between categories of wars cannot but be somewhat artificial and arbitrary. Appreciating this difficulty and danger, we suggest here that deeper study of the embitterment scale (and its several primary parameters: time, issues at stake, persuasiveness of means) yields substance to the idea of a cleavage on the scale of the war spectrum and that the spectrum of actions can be divided into two fairly distinguishable though not cleanly separable domains.

Clearly war has many faces, for the underlying forces are deeply and inextricably interwoven, interacting each with the others and varying in relative importance. The evident relationship between the level of embitterment and the violence or persuasiveness of associated measures means that military considerations play an increasingly dominant role going down the scale. At the upper end of the scale, for example, issues are resolved (or fade away unresolved) without recourse or reference to force—that is to say, military forces play no part. On the other hand at the lower end of the scale military considerations may be limited (in principle at least) only by capability. Certainly until recent years the maximum resources of a nation available for allocation to military purposes and, too, the maximum destructiveness achievable by in-being military forces were in fact comparatively limited. Now, however, science and technology have effectively removed both these limits. Both the absolute magnitude of a nation's resources allocable to military purposes and the efficiency and effectiveness ("bang per buck") of weapons have increased enormously. Indeed, so great has been the increase that the destruction and devastation which can be produced are hard to comprehend and may even be said to be "unlimited." Thus the lower end of the embitterment scale can be thought of as the domain of unlimited or general war. It is so named.

In complementary fashion the remaining upper portion of the scale is the domain of limited or nongeneral war—the domain where military and nonmilitary factors are so deeply and inextricably intertwined that the military may play any one or more of many roles or none at all, but in no case is the action ever full-out. The distinctly subordinate role of the military means that the presence and pre-eminence of political and nonmilitary considerations are conspicuous characteristics of limited war. War is at heart a political activity in that war aims are inseparable from political aims. It follows, therefore, that a nation's political leadership has a heavy, indeed, inescapable responsibility to lay down general policies, guidelines, or conditions within which military plans are prepared and operations executed.* Thus, for example, guidelines might specify what means, procedures, and weapons are permissible, what targets are and are not out of bounds, what costs or penalties are tolerable, and what constitutes victory.

The virtually explosive expansion in destructive capabilities has led to an extremely short, almost discontinuous transition (on the embitterment scale) from limited to unlimited effects. Thus arises the idea of a marked change along the scale of the war spectrum, the idea of the existence of two distinguishable though not cleanly separable domains.

time and issues

The embitterment scale can also be interpreted in terms of time and relative importance of the issues directly and immediately at stake, that is, in terms of the gravity or urgency of the threat to national survival. In the larger view, perhaps, all issues along the scale are vital: they threaten survival, the principal variables being directness and immediacy of the threat. In the limited-war regions the effects of individual actions are relatively small (water drops on a stone), so that many must

*Abdication of such responsibility is itself a form of leadership action.

occur before their cumulative effects are deemed significant.* Hence much time must pass before resolution of the question of survival. From this stems the idea of "protracted war," of a war of "unlimited" duration.

Going down scale, the directness and gravity of the threat to survival increase, and the time to resolve the question decreases. At the bottom of the scale the issue is directly and immediately one of sheer survival. Modern technology, with its globally ranging, catastrophically destructive devices, not only dramatically reduces the time to resolve the question of threat to national survival but also, as for instance in a direct attack upon the homeland, is relatively unambiguous in that there is little doubt about whether or not national survival is at stake.

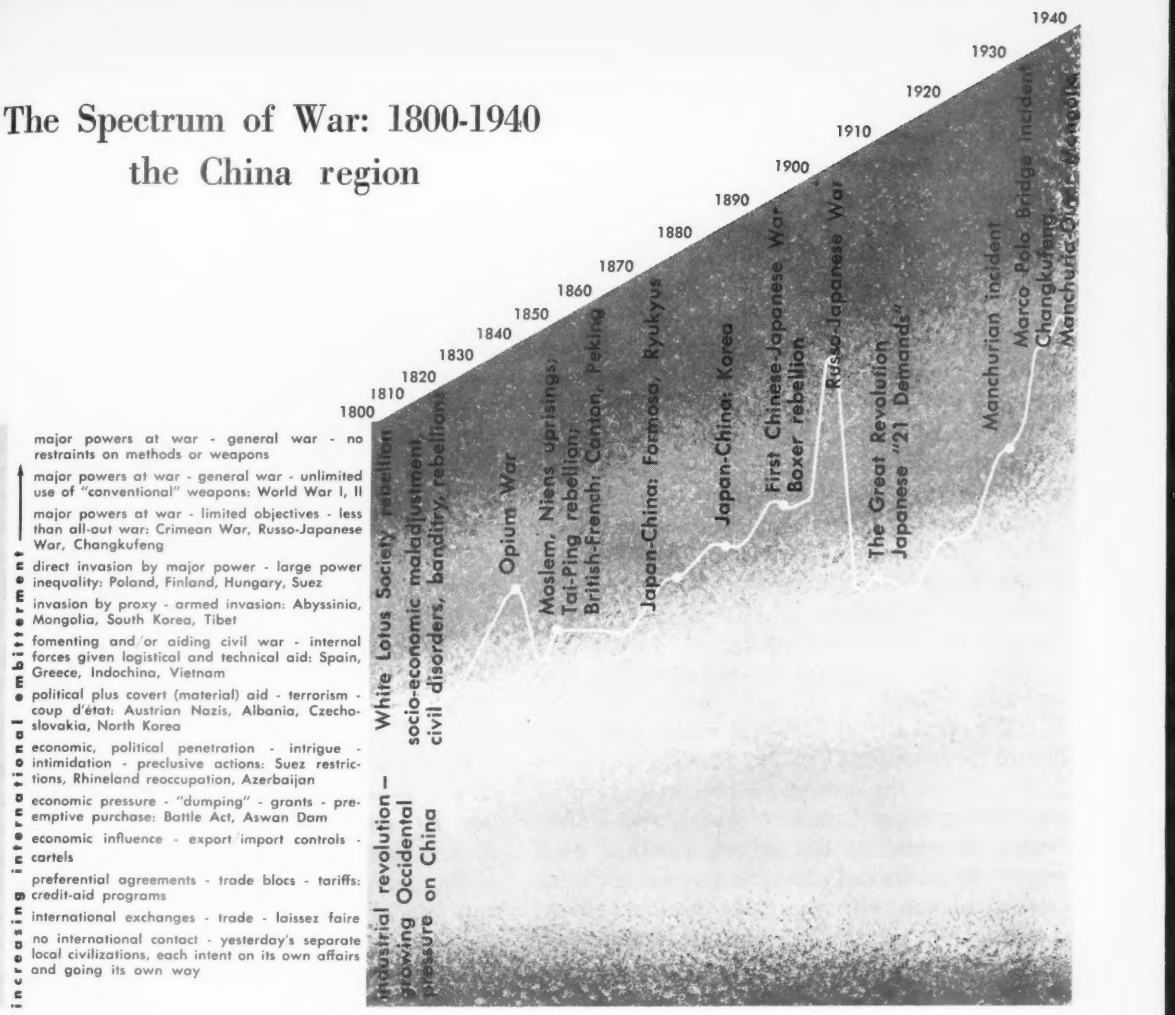
The directness of such a threat, plus the speed with which the blow can be delivered, gives substance, therefore, to the idea of an extremely short, almost discontinuous transition on the embitterment scale from what appear to be nonvital threats to those which are obviously and unambiguously vital, from damaging effects which occur piecemeal and are individually small to those which are obviously and unambiguously matters of life and death. Thus again arises the idea of a kind of cleavage along the scale and therefore the existence of two distinguishable domains of war.

The accompanying illustration shows two domains on the war spectrum. The intermediate or transition region is portrayed as a broad, only loosely defined band so as to emphasize the artificiality and imprecision of the dividing line. Adducing a basic cleavage in the spectrum of war according to whether or not survival is directly and unambiguously at stake has led (to the functional-forces minded) to the idea of general and nongeneral war forces. The former are implicit in the organization and missions of general-war deterrent/retaliatory forces with their enormously destructive global-ranging delivery vehicles, the latter in references to conventional and unconventional forces, the so-called limited-war forces.

*We assume in this the view or vantage point of a major power. The vantage point is important, for it establishes the base. Thus, for example, what seems and in fact may be an action of the utmost gravity (that is, life and death) to a nonmajor power may be of no more than secondary importance to the major power protagonist.

the spectrum of war: 1800-1940 (the China region)

Utilizing the war spectrum scale as one axis and time as the other, we can establish a two-dimensional coordinate system within which war actions can be presented in organized fashion. The accompanying illustration is so constructed and graphically depicts the war history of the China region for the nearly one and one-half centuries prior to World War II. The picture clearly shows the intrinsically spectrum nature of war—that is to say, that wars are spectrumlike not only in forms and gradations of embitterment but also in time. Surely it is unrealistic, custom and the cold language of history books to the contrary notwithstanding, to expect actual discontinuities in the affairs of men, to expect that wars start and stop abruptly. In the conventional manner certain "points" along the time axis, here labeled war, rebellion, revolution, *et al.*, would be shown extending over a finite, usually relatively short, period with the understanding (implied) that the eruption was followed by peace. But as so often happens in human affairs, there can be an appreciable difference between image and reality. Wider and more intensive examination of the historical record points strongly to the view that war is in fact deeply immersed in and entangled with its environment and does not simply and suddenly cease. Rather, the level of embitterment, that is, the form and/or intensity of the war, merely drops to another and lower level, sometimes precipitously, sometimes gradually. The appearance or impression of calm immediately following "termination" of war may only indicate (a) recognition by one protagonist or the other of superior force ("For he who fights and runs away may live to fight another day." —Goldsmith); (b) the presence of a more urgent issue forcing the first into the background; or (c) that the original issue has


The Spectrum of War: 1800-1940
the China region
increasing international embitterment
major powers at war - general war - no restraints on methods or weapons
major powers at war - general war - unlimited use of "conventional" weapons: World War I, II
major powers at war - limited objectives - less than all-out war: Crimean War, Russo-Japanese War, Changkufeng
direct invasion by major power - large power inequality: Poland, Finland, Hungary, Suez
invasion by proxy - armed invasion: Abyssinia, Mongolia, South Korea, Tibet
fomenting and/or aiding civil war - internal forces given logistical and technical aid: Spain, Greece, Indochina, Vietnam
political plus covert (material) aid - terrorism - coup d'état: Austrian Nazis, Albania, Czechoslovakia, North Korea
economic, political penetration - intrigue - intimidation - preclusive actions: Suez restrictions, Rhineland reoccupation, Azerbaijan
economic pressure - "dumping" - grants - preemptive purchase: Battle Act, Aswan Dam
economic influence - export/import controls - cartels
preferential agreements - trade blocs - tariffs: credit-aid programs
international exchanges - trade - laissez faire
no international contact - yesterday's separate local civilizations, each intent on its own affairs and going its own way
1800
1810
1820
1830
1840
1850
1860
1870
1880
1890
1900
1910
1920
1930
1940
Industrial revolution
growing Occidental pressure on China
White Lotus Society rebellion
socio-economic maladjustment
civil disorders, banditry, rebellion
Opium War
Moslem, Nien uprisings;
Tai-Ping rebellion;
British-French: Canton, Peking
Japan-China: Formosa, Ryukyus
Japan-China: Korea
First Chinese-Japanese War
Boxer rebellion
Russo-Japanese War
The Great Revolution
Japanese "21 Demands"
Manchurian incident
Marco Polo Bridge incident
Changkufeng
Manchuria-Outer Mongolia

simply faded into the past unsolved.*

Expressive as is the graphical representation of Chinese history, it gives little hint of the great human drama. Losing their successive "Mandates from Heaven" and, therefore, the right to rule, for milleniums dynasty followed dynasty in China. Latterly, for example, the Ming dynasty from 1368 to 1644; from 1644 to 1911, that of the Manchus (Ching); the Great Revolution in 1911–12, Sun Yat Sen and the Chinese Republic; a new government in 1928, Chiang Kai-shek, its president; another government in 1949, the Chinese People's Republic. Thus the official record, but between and behind these dry and antiseptic dates there is the great human drama.

The nineteenth century for China, a tortured land, has been called the predatory century. It was a period of continuing turbulence, violence, and chaos, of economic dislocation, plunder, and pillage, of chronic political unrest and outbreaks of war, of recurring floods and great famines, of destruction, reconstruction, and destruction. It was an era of foreign pressures, of spheres of influence and extraterritorial rights, of humiliations and defeats; forces from within and forces from without pounded and tore at the foundations of a

*Judge Learned Hand has pointed out that many of the issues that mankind sets out to settle never are settled and the disputes fade into the past unresolved. The dispute may be renewed and fought over again or, perhaps, be gradually replaced by an uneasy compromise which, although not wholly satisfactory to both sides, offers a tolerable substitute for victory.

once-proud empire. Wars sapped the government's strength and bared its military weaknesses. Bandits, war lords, and revolutionists multiplied and grew bolder; foreigners exploited the growing internal weakness and decay; foreign governments imposed unequal treaties and staked out concessions. The British, French, Russians, Germans, Italians, and Japanese firmly established themselves in China. Penetration and conquest were less military and more economic and technological. The growing political and social ferment gradually dissolved the "Mandate of Heaven" given the Manchus, and the dynasty toppled. The curtain rose on a new scene, The Great Revolution, but the stage was the old familiar one. Political unrest and civil wars continued; war lords and politicians fought for supremacy; then came the Communists. All fought one another and contested authority of the central government.

Between the two World Wars, the interests of three nations clashed directly and hard: in the north, the Soviets; Japan in the south; the third nation, China. A fourth, the United States, hovered at the edges, limiting itself largely to politico-diplomatic moves. All these had to reckon with the Old Marshal, Chang Tso-lin, who physically controlled Manchuria and had a private army of some three-quarters of a million men.

China is an ancient land, an immensely populous, variegated, complicated country. Something of this extraordinarily complex background must be understood by those who would understand the China problem.

The continuum-in-time nature of war is illustrated by the long and tortuous pattern of the embitterment index for the China region. The limiting-line characteristic of this index expresses the cumulative characteristic of the means inventory, that is, that the various measures (tools and techniques) associated with each or all lower "wavelengths" at each point on the spectrum may simultaneously play a role. The horizontal plane area, bounded by the limiting-line and shaded to match corresponding regions along the embitterment scale, has this meaning.

The intrinsically spectrum nature of war suggests that the principal argument for creating and maintaining high-speed military reaction capabilities cannot be that war suddenly breaks out but may perhaps be more fairly ascribed to national habits of imperceptiveness and procrastination. The development and maintenance of speedy military response capabilities can on occasion help compensate for such dangerous national habits, but where such dependence obscures or excuses continuing nonanticipatory planning and action the effect may only be to postpone ultimate disaster.

toward a more generalized construct

War, however, is a general phenomenon and consequently more fittingly studied on a larger stage. Limiting the representation to war activities in and about one country or region reduces the number and complexity of the actions and interactions but risks serious distortion. The war record of one country is only part and not a cleanly separate part of the general phenomenon of war. A possible way out of this difficulty might be to enlarge the field of view to encompass many countries but to focus only on selected portions (segments) of each of the action-limiting lines. Such an approach itself poses the question, then, of what segment of each limiting line to select as most interesting and representative. This is not an easy decision to make, but as we contemplate the general environment and the courses of the war actions presented on the two-dimensional coordinate system, we observe that as the actions rise on the embitterment scale, their slopes (action intensity versus time) appear more precipitous. That is to say, lower down the scale the actions appear more continuous and the transitions up and down the scale gentler. It may be—at the risk of appearing to argue by analogy—that the low intensity level actions are something akin to the background noise of electronics in that they are always present; that the higher intensity level actions are deviations, relatively short-lived and steep-sloped.

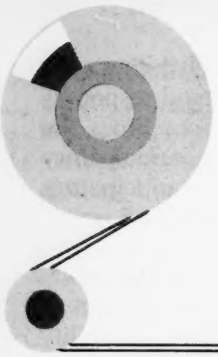
Suggesting a certain analogy between the spectrum concept of war or international embitterment and the background noise of electronics leads to the notion that war must be viewed in some such fashion, for the actions are but the visible expression of the continual pushing, jostling, and scraping that go on as societies react and adjust to changing conditions. Societies must come to terms with their changing environments or vanish. The accommodation may be piecemeal and slow, or quick and violent; the one evolutionary, the other revolutionary. Human history is a long record of vanished societies which have been unable or unwilling to come to terms with new conditions. Environments continuously change and hence continuously pose new challenges. Directly or indirectly new and changing conditions call for and, in fact, demand responses and adjustments by societies. Sometimes the responses and adjustments are anticipatory and voluntary, at other times unanticipatory and involuntary. Such, as Erich Fromm points out, is the record of man and society.[6]

All this is to say that the recurring vision of a world without war is probably chimerical. Rather, our hope and indeed our responsibility lie in ceaselessly striving to push the limiting line of international embitterment down scale and avoid or eliminate cataclysmic accommodations. To seek less is to abdicate our responsibilities as free men; to seek much more is to chase shadows.

Santa Barbara, California

Notes

1. Dan Kurzman, *Kishi and Japan* (New York: I. Obolensky, Inc., 1960), p. 130.
2. Pierre Gallois, *The Balance of Terror* (Boston: Houghton Mifflin Co., 1961), p. 6.
3. George F. Kennan, *Russia and the West under Lenin and Stalin* (Boston: Little, Brown and Company, 1961), p. 398.
4. Peregrine Worsthorne, "Democracy v. Liberty?" *Encounter*, VI, 1 (January 1956), 5-13.
5. Denis Warner, *Hurricane from China* (New York: Macmillan Company, 1961), p. 10.
6. Erich Fromm, *May Man Prevail?* (Garden City, New York: Doubleday & Company, Inc., 1961).



"INSTANT" PERSONNEL MANAGEMENT

COLONEL LONNIE E. MARTIN

THE VAST and sweeping changes rapidly taking place in Air Force personnel administration will soon directly affect all Air Force personnel. It is no exaggeration to say that these changes afford the greatest opportunity for improvement in personnel management in the history of the Air Force.[1]

The emphasis is on a "total system" that takes maximum advantage of the tools and techniques of management science, information technology, decision theory, and data-processing technology. Terms and concepts such as exception reporting, data automation, interrogation, display, simulation, and cybernation* will soon be widely understood and employed by Air Force personnel managers.

The average airman may be apprehensive about what the new system will mean to him. The conversion of his basic personnel record to a few punched cards or to less than two inches of magnetic tape may conjure up visions of a vast, impersonal, automated system that is controlled by sophisticated electronic computers instead of by people. Actually there is greater cause for rejoicing than for apprehension:

> The application of automatic tools and techniques for the planning, control, and utilization of the personnel resource does not mean that 'personal' consideration is removed from personnel management. The needs of the individual are of primary importance, and it is through the use of advanced techniques that more complete, accurate, and timely information will be available for study and use by managers. In fact, more specific attention can be given to the needs, career, and potential of each individual.[2]

*The joint use of automation and computers.

But it is understandable if the average Air Force man does fear a system of this kind. Major General Albert P. Clark, former Director of Military Personnel, Hq USAF, recognized that we *could* default our management responsibilities to the computer and that it is important to guard against such defaulting. He states that ". . . whereas the computer can handle those factors that can be quantified, it cannot begin to handle the several areas where judgment is involved. . . ."[3] And General Spaatz once advised General Timberlake, former DCS/Personnel, Hq USAF, not to ". . . let those computers get involved in the personnel business!" He said that we ". . . must keep the *heart* in Personnel."[4]

Experience has already shown that such apprehensions are not justified. The widespread use of punch-card and computer systems need not take the "heart" out of personnel management. Quite the contrary, according to General Childre: "Actually, our present system could be more nearly 'branded' in this manner since we have only a limited capability of handling information."[5]

The fascinating story of personnel system

development can be condensed to narrow scope only with difficulty because the personnel systems staffs in the Pentagon and major air commands are laboring monumentally with developmental plans and projects of almost incredible magnitude and multiplicity. Secretary of the Air Force Zuckert began a recent address to the Los Angeles Chamber of Commerce by stating that ". . . we work in three time brackets in the Air Force—today, tomorrow, and the day after tomorrow."[6] The Secretary went on to develop this theme in relation to our weapon systems. The same theme can well be used to organize the story of personnel system development. Let us first look briefly at the "today" phase—our present personnel system.

today—the present system

Our present personnel management control system has not been perceptibly altered during the last ten to fifteen years. Occasional face liftings have merely mechanized existing clerical processes. No one has taken a complete look at the total personnel function, its many complex interrelationships, and the interdependence of its various component parts. The development of a truly integrated personnel management control system thus remains to be accomplished.

Most readers are aware of some inadequacies in today's personnel system. Its reaction capability is limited, yet we face a period in which fast reaction to program changes is imperative. The information on which personnel managers must base critical decisions is frequently outdated. It is small exaggeration to say that the personnel manager must wrestle with such voluminous summary reports that he is virtually threatened with a hernia when he tries to lift them. There is an insufficient amount of data in easily manageable form at any echelon of command, and mechanized data are often inaccurate. Rapid and valid decision-making is thus impaired. Under these conditions the personnel administrator cannot give each individual the careful attention and personal consideration to which he is entitled.

Recognizing these problems, some major air commands took the initiative a few years ago and developed mechanized personnel systems of their own. Lacking central guidance, these individual command systems were mission-oriented and somewhat incompatible with each other. It soon became apparent that the Air Staff needed a central office to control the development of a mechanized system on an Air Force-wide basis. Such an office was created in the fall of 1961. It is now known as the Assistant for Personnel Systems and is directly responsible to the DCS/Personnel, Hq USAF.

The new office first developed a master plan, a plan designed to set forth the various developmental efforts or projects and ensure their complete compatibility with each other. The master plan covers a wide range of personnel activity that can be subdivided into several distinct areas, such as programs, personnel policies and rules, management tools, plans, data, and organization. But let us confine our attention to two broad categories of the master plan, "the interim system" and the "long-range system."

tomorrow—the interim system

The interim system is the "tomorrow" phase of personnel system development. It involves many changes in organization, functions, and management. The Air Force has already opened the door of "tomorrow" and has one foot crossing its threshold in that a significant beginning has already been made on most interim system projects. Personnel system development under the interim system has resulted in increasing centralization and mechanization.

The assignment function for officers and airmen has been centralized at major air command level. This amalgamation provides better assignment and utilization under the present system and facilitates transition to the full mechanization of assignments. It is also a logical prelude to the ultimate centralization of assignments at Hq USAF level.

Personnel activities on each base have been centralized or consolidated by major air commands. For example, all SAC units on a

given base are serviced by a single SAC Consolidated Base Personnel Office (CBPO); all ADC units on one base are serviced by a single ADC CBPO, and so forth. Although there are some exceptions to this rule, it applies generally throughout the Air Force. This worldwide functional consolidation is a major change in the area of personnel organization. Formerly it was common to find as many as 20 to 40 separate personnel offices on bases of average size. It is interesting to note that Air University, with its unique mission and organizational structure and with personnel distributed throughout the Continental United States and several foreign locations, has been able to reduce its base-level personnel offices to only two.

By mid-1964 or early 1965, when the interim system will have been fully implemented and after mechanized personnel procedures have been completely standardized Air Force-wide, there will be only *one* CBPO on each base. The CBPO of the host base will render complete personnel servicing to all units on that base regardless of command affiliation. Throughout the Air Force eyebrows have been raised in some skepticism at the prospect, for example, of an ATC base performing all personnel administration for a SAC unit resident on that base. But this is what the plan calls for.

All consolidated base personnel offices have been "mechanized." They have acquired punch-card equipment, and all 307 of them have completed the mechanization of health-immunization and leave records. The personnel function is gradually assuming responsibility for the input of mechanized data into the reporting and accounting system. This has previously been a responsibility of data services and statistics agencies under the comptroller function. CBPO's will also maintain basic personnel records in punch-card form on officers and airmen. Personnel record keeping, strength accounting, and reporting will be mechanized at base level.

Major air commands and Hq USAF will maintain personnel records on magnetic tape and will process personnel data on high-speed electronic computers. CBPO's will update major air command records daily by sending changes on punched cards which are fed into the computers. Major air commands will update Hq USAF records weekly by sending changes on magnetic tape. Data will flow between these three echelons via the Air Force Data Communications System (AF DATACOM), the world's largest, most advanced digital data system. The DATACOM system is high-speed, fully automatic, transistorized, and worldwide in scope. Personnel managers in the Pentagon now must often work with data that are three or more months old. This new system will enable them to base decisions on current information. The new system will approach "instant" management. These increased personnel data-processing capabilities will result from implementation of the Personnel Data System—Officers (PDS-O) and the Personnel Data System—Airmen (PDS-A), which will go into effect in the autumns of 1963 and 1964, respectively.

Personnel data on magnetic tape can be manipulated rapidly and used in a variety of ways. Officer assignment is a good example. The assignment activity punches an inquiry card which is fed into the computer. The inquiry card activates the computer to print out at high speed the personnel records of only those officers who meet the qualifications stated on the inquiry card. The assignment officer then makes his selection from the computer output.

Note that the assignment officer, not the computer, makes the actual selection. Again quoting General Clark, this interrogation or inquiry application ". . . highlights the nature of the supporting role of . . . information technology. We permit the computer to screen on *quantitative* information, but we reserve (and will always continue to) the *qualitative* factors for individual judgment."[7]

Automated systems, improperly applied, could tend to dehumanize the assignment process, and for this reason ". . . we must constantly stand guard in Personnel against considering only those factors that can be *quantified*. We must not get lazy or impatient." On the other hand, the ". . . proper combination of *computer assistance* and *personal judgment* will result in more accurate and faster assign-

ment decisions." We must use the computer capability ". . . in such a manner that the development preferences of all individuals—especially our younger officers of great ability—get the same consideration that is currently given to the few who have somebody of influence looking out for their interests."[8]

The Air Staff is erecting formidable safeguards against the cybernation dangers to which General Clark has referred. The following quotation from a proposed and forthcoming change to the military personnel assignment manual is indicative:

> Electronic data processing equipment will be used as a tool to assist Commanders and Personnel Officers to discharge their responsibilities with respect to the assignment of officers. Computers and computer-produced information will be used to identify, from data recorded on the UOR [Uniform Officer Record, which will be maintained in punch-card form in the CBPO's and on magnetic tape at major air commands and Hq USAF], officers who possess specified qualifications. From the list of officers so identified, Personnel Officers may determine the specific individual for the assignment in question. Computers may also be used to tentatively identify an individual for a specific assignment. *Assignment instructions will not be issued, however, until a responsible officer has carefully evaluated the requirements of the position and the availability for reassignment and qualifications of the officer involved.* The assignment preference of the individual officer concerned, as recorded on his UOR, will be a criterion in all screening actions accomplished by the computer and will be verified by the officer responsible for making the assignment decision. Other criteria used for identification by computer will be selected so as to assure compliance with all assignment policies prescribed by this manual.[9]

This statement should allay the fears of even the most dubious, and thus I believe we need say no more about "computer dehumanization" of the assignment process. The next question that arises is: How accurate will our mechanized personnel data be?

Throughout the interim system great emphasis is being placed upon the accuracy of data at the source of input into the mechanized system. Rigid manual auditing is required. Moreover, a number of automatic edits have been established at major air commands and Hq USAF to further guarantee data accuracy. The computer will be able to recognize and reject certain types of erroneous data automatically and return them to the originator for correction before they will be entered into the system.

Some of the interim system projects are being developed by SAC, TAC, and ATC. ATC has developed the computer interrogation or inquiry system that will be used at major air command level to manage officers. SAC is developing a similar system for airmen. TAC is developing the punch-card systems and procedures to be used by CBPO's throughout the Air Force to implement and operate a standardized system at base level. TAC is also trying to optimize CBPO organization and to develop firm standards for determining manpower requirements within the CBPO.

ATC is developing two additional automated systems. One will be used to select airmen for enlistment, for entry into technical schools, and for subsequent assignment against projected vacancies. The other will combine the separate procedures for collecting student data and use a single mechanized record for the better management of pipeline students.

Under the interim system the Air Force will have more mechanized data at every level of command than ever before. Mechanized officer data factors will double at base level and quadruple at major air commands. The mechanized data repository at Hq USAF will also increase.

In summary, the interim system, the "tomorrow" phase of personnel system development, should be fully operational by late 1964 or mid-1965. The interim system will give us more mechanized data, more accurate mechanized data, and more timely mechanized data. It is a transitional system designed to bring all major air commands up to the same level of mechanized personnel proficiency. Each major air command and Hq USAF will then be ready to progress to the more sophisticated systems that will come into being under the long-range system, the "day after tomorrow"

phase. However, the new Personnel Center should be mentioned briefly before we examine the long-range personnel system to be built around it.

During 1963 and 1964 the Air Force will establish a Personnel Center at Randolph AFB, Texas. Moves from the Washington, D.C., area have already begun. Personnel functions of an operational nature will move to the Personnel Center; personnel policy and planning agencies will remain in the Pentagon. The Personnel Center will have its own computer complex to support the personnel function.

The Personnel Center will exercise a rapidly increasing degree of centralized personnel management. Personnel assignments provide the best example. The Air Force is working toward a man–job match capability whereby all officers and NCO's above the grade of technical sergeant will be assigned, by name, directly from the Personnel Center to specific UMD positions throughout the Air Force. Lower-grade airmen will likely be assigned directly from the Personnel Center to specific CBPO's.

Of course it will be impossible to achieve this worldwide centralized assignment capability concurrently with establishment of the Personnel Center. But there is every reason to believe that this ambitious objective will be realized under the long-range system.

The creation of the Personnel Center is probably the most significant single event in personnel system development. It will tie together, both functionally and geographically, the over-all management of the basic personnel functions of procurement, training, and assignment. It is a major advance in the area of management and organization.

the day after tomorrow—the long-range system

The long-range system involves a total system approach to data system development. Personnel systems planners are considering the total requirements of the functional area of personnel. They seek to integrate all related activities and functions to the maximum extent practicable. The system will fully exploit sophisticated data-processing equipment and output media, such as high-speed electronic computers, exception reporting, and video display devices. A total automated personnel management information and control system will be the result.

The basic personnel management objective is to procure and train capable people to meet our needs, to ensure the individual and group welfare of these people, and to use them in a manner that will best support the aerospace mission. We can never attain this overall objective unless we continually recognize that people, our most valuable resource, make up the personnel inventory and unless we provide professional career management for them.[10] It is for these reasons that the following are included among concepts for the design and operation of the long-range system:

> The individual is of prime consideration and all data will be capable of being related to him.[11]
>
> Decisions automatically handled in the system will be based upon criteria provided by personnel managers and will always be subject to revision and review.[12]

The long-range system consists of a series of projects. Some are being worked on now, others are still in the conceptual stage. The responsibility for developing the long-range system is also a shared responsibility between Hq USAF and the major air commands. The Air Staff simply cannot amass a sufficient quantity of skilled resources in one central location to do the total job. However, the Air Staff (including the Personnel System Development Office, Bolling AFB, D.C., which is under the operational control of the Assistant for Personnel Systems) is shouldering a major share of the burden of the long-range personnel system development and is exercising firm control and guidance over long-range projects being developed elsewhere.

Systems planners have announced interesting long-range concepts concerning personnel data. The mechanized personnel data base will be enlarged to provide practically all information required for personnel management. Also data elements (personnel terminology) used in the mechanized system will be standardized Air Force-wide.

Personnel managers at every level of com-

mand will have rapid access to personnel data that are maintained in mechanized form. The personnel manager will be able to interrogate the repository of mechanized data and receive a display in visual or document form. Personnel information will be available in the form of hard-copy printouts, graphs, charts, microfilm, and group projections.[13] Telephones with video hookups will probably be available to the personnel manager for display purposes by the 1970 time period.[14]

There will be rapid data-handling links between the Pentagon and the Personnel Center. These links will enable personnel management at the highest level (the Pentagon) to inquire at will against the Personnel Center's huge records and data repository and receive whatever information is needed in whatever form required for direction, control, and decision purposes.

The Air Reserve Records Center is now developing a data system for Reserve and Air National Guard personnel that is tailored more closely to the requirements of the active duty structure and will enable a rapid exchange of data between the permanent establishment and the Reserve forces. The present system for handling data on Reserve and Air National Guard personnel is incompatible with forthcoming data systems for active duty people.

Storage requirements for hard-copy records will be reduced through the use of some miniaturization medium such as microfilm. Also the over-all data system will be event-oriented to the extent that any event that causes a change in the data repository will be promptly entered into the system at the command level where the decision occurs.

Finally, concerning data concepts, the Personnel Center will, as previously mentioned, maintain a central personnel data and records repository. The Personnel Center will act as a clearinghouse for all personnel data entering or leaving the mechanized system or for data that is passed from one major air command to another.

Under the long-range personnel management system, personnel procedures will be standardized Air Force-wide. Commands and bases will process identical personnel actions in the same fashion. Command and base personnel regulations will be eliminated except where needed to provide for command and base peculiarities. Also a major effort is under way to streamline and simplify personnel procedures, taking full advantage of modern information technology and disregarding existing policy and organizational restrictions.

Computer simulation is an extremely promising technique for application to the personnel area. Simulation will give personnel policy-makers an urgently needed "what if" capability. For example, *if* we change the promotion policy, *what* will be the effect of that change on the force structure, career motivation, retirements, separations, and so many other personnel factors that interact in tremendously complicated ways? The ability to assess or accurately determine the effect of a proposed change before it is approved and implemented will be a major milestone in personnel management. Personnel planners today must often rely largely on intuition in making personnel policy changes—an extremely hazardous business.

Computer programs of trend analyses likewise promise to increase the efficiency of management in the various functional areas of personnel. The computer will be able to digest mass volumes of data and let the personnel manager know whether his decisions are producing the desired trends.

A centralized manpower authorization file updated on the same frequency as the personnel file is essential if assignments are to be efficiently centralized at the Personnel Center. A central inventory of current manpower requirements data will also improve personnel management in areas such as procurement and training.

SAC is developing a base-level computer system that will replace the current punch-card accounting-machine system. Under the new system base-level computers will be used to prepare personnel data required by higher echelons and also to provide a rapid inquiry capability to satisfy requirements of base-level managers for personnel information. This project may be useful sooner than originally ex-

pected because of a recent decision to install two computers at most Air Force bases throughout the world. The use of a computer instead of punch-card accounting machines will give CBPO's a much greater data-processing capability.

Projects and concepts in the areas of programing, budgeting, planning, and actions are also progressing. Systems are under consideration or development that will automate the military personnel pay process, the determination of quantitative and qualitative officer and airman requirements, the production of a military personnel program, and the creation of a military personnel budget. Other systems will provide personnel managers with automated data systems support in the areas of personnel evaluation, separations, and promotions. Under the long-range system it is probable that promotion selection boards for the grades of senior master sergeant through colonel will be held only at the Personnel Center. A system will also be designed to enable continuity of operations in the event the central personnel records and data repository of the Personnel Center are destroyed or damaged.

THIS BROAD-BRUSH general picture of personnel system development by no means tells the whole story, but hopefully it gives the reader some appreciation of the tremendous scope and magnitude of the development effort.

Our present system does not meet today's demands. The interim system will produce the first major improvements in Air Force personnel management and will serve as an excellent transition to greater sophistication. The long-range system will take full advantage of modern information technology and advanced operating techniques.

The paramount objective of the entire effort is better personnel management rather than a saving of manpower spaces.[15] The Air Force urgently needs the management improvements that the new system will bring. Recent international crises have clearly revealed the need.

The personnel systems planners in the Pentagon deserve much credit. Their thinking, obviously unconfined by tradition, has transcended present organizational and policy barriers. They have naturally encountered much opposition; indeed some of their major successes lie in the field of "salesmanship." Many influential Air Force members have opposed the system on various grounds, e.g., we're moving too fast, we're trying to get too sophisticated too quickly, the proposed new systems are too radical, and so forth. To such opposition the systems planners have calmly responded that we must look to change as a potential ally and not as something to be feared.[16] The systems planners have sold their case to the right people and are now receiving ample support. Generals Stone and Childre, in the personnel area, and Generals Bogart and Grossmith, in the comptroller area, have promised their full support wherever needed to dispel the "status quo" influence and resistance to change which are still prevalent in certain quarters of the Air Force and which once threatened the success of the program. The over-all personnel development effort has the forceful encouragement of General LeMay.

AND NOW the final question: To what extent will computers make personnel decisions?

> We are rapidly gravitating toward the use of computers to apply logic automatically. This is not to say that computers will make decisions for managers. Rather, the computer will examine the circumstances involved and take appropriate action (decision making if you will) based on the predetermined rule to be followed under a given set of circumstances. The important point is that a human being made the decision. The function of the computer is to take appropriate action based on the decision.[17]

By making routine decisions—by analyzing the circumstances and then applying that predetermined rule—the computer will provide the personnel administrator with better management tools which, in turn, can produce more effective human decisions. Voluminous periodic reports will be reduced or eliminated and replaced with current situation reports and screenings to which human judgment can be more effectively applied.[18]

Under the new system the individual will get a higher degree of "individualized" or personalized attention than he now gets. The personnel manager will have more complete, more accurate, and more timely information than ever before, and he will have the capability to digest that information systematically –a capability lacking under the present system. The "... tools and techniques of automatic data processing will not dehumanize personnel management, but will ... reduce the routine clerical and administrative effort currently required. The system will provide a means for the personnel manager to give more time and attention to the career and utilization of each individual."[19]

One final observation for those who retain misgivings about the potential extent of computer encroachment on human endeavor: Even our marvelous technology holds little promise of endowing the remarkable electronic computer with such requisite attributes as brains, courage, loyalty, dedication, love of liberty, and the capacity for original thought. I can thus predict that neither the reader nor the author will be around when computer actions replace human judgment in the critical decision areas of personnel administration.

Headquarters Air University

Notes

1. Brigadier General Louis B. Grossmith, Jr., address to USAF World-Wide Personnel Systems Conference, USAF Academy, 27 Nov-1 Dec 62.
2. *The Long Range Plan for the Personnel Management System, Blueprint of the Total System* (Bolling AFB, D.C.: Personnel Systems Development Office, 19 Nov 62), p. i.
3. "Information Technology as a Tool for Personnel Managers," address delivered at the World-Wide DCS/Personnel Conference, Myrtle Beach AFB, S.C., 9 May 62, p. 24.
4. Quoted by General Clark, *ibid.*
5. Major General Cecil H. Childre, script of keynote address, USAF World-Wide Personnel Systems Conference, USAF Academy, 27 Nov-1 Dec 62, pp. 3-4.
6. Quoted by Colonel Robert P. Livingston, addressing USAF Representatives Conference, Maxwell AFB, Ala., 14 Feb 63.
7. General Clark, *op. cit.*, p. 5.
8. *Ibid.*, pp. 6, 25.
9. Air Force Manual 35-11, *Military Personnel Assignment Manual* (proposed), undtd, ch. 5, pp. 3-4.
10. *Long Range Plan*, pp. 7-8.
11. *Ibid.*, p. 11.
12. *Ibid.*, p. 12.
13. *Ibid.*, p. 22.
14. Arthur L. Bloomquest, script of briefing: "Management in the 1970's," USAF World-Wide Personnel Systems Conference, USAF Academy, 27 Nov-1 Dec 62, p. 7.
15. General Childre, *op. cit.*, p. 4.
16. Colonel A. Kenneth Swanson, briefing: "Goals and Objectives," USAF World-Wide Personnel Systems Conference, USAF Academy, 27 Nov-1 Dec 62.
17. Bloomquest, *op. cit.*, p. 4.
18. Air Force Manual 30-3, *Mechanized Personnel Procedures* (proposed), ch. 17, p. 2.
19. *Long Range Plan*, p. 40.

COUNTERINSURGENCY IN PERSPECTIVE

LIEUTENANT COMMANDER ROGER J. MILLER,
U.S. NAVY
AND
LIEUTENANT COMMANDER JAMES A. COCHRAN,
U.S. NAVY

"If you know yourself and your enemy,
You need not fear the results of a hundred battles.
If you know yourself but not your enemy,
For every victory gained, you will suffer one defeat."

—Sun Tzu, *The Art of War*
Sixth Century, B.C.

IN THE present bipolar world, the deterrent capability of the United States and its allies has discouraged overt aggression across international boundaries by the Communist bloc. Nevertheless the free world's success in containing open Communist imperialism during the past decade has not diluted the ambitions of Kremlin leaders for world conquest. Rather, they have been forced to seek less direct methods for expanding their sphere of domination.

At a meeting of the Soviet Communist Party organizations on 6 January 1961, Premier Khrushchev, referring to "new means of mass destruction," stated that "... the prevention of a new war is the question of all questions." He then went on to outline current Communist tactics of subjugation by dividing wars into three categories: world wars, local wars, and liberation wars or popular uprisings. While the first two were described as hazardous because of their potentially nuclear character, he said of the third category:

> Liberation wars and popular uprisings will continue to exist as long as imperialism exists. Such wars are not only admissible but inevitable.... We recognize such wars. We help and will help the people striving for their independence. Can such wars flare up in the future? They can.... In other words, can conditions be created where a people will lose their patience and rise in arms? They can. What is the attitude of the Marxists toward such uprisings? A most positive one.... These uprisings must not be identified with wars among states because in these uprisings the people are fighting to exercise their right to self-determination and for their social and independent national development.... Communists fully and unreservedly support such just wars and march in the van of the people fighting wars of liberation.

These words—echoes of the philosophy

of the leading Communist theoretician of guerrilla warfare, China's Mao Tse-tung—demonstrate at least superficial agreement between Moscow and Peiping that indirect aggression in developing countries, under the guise of "wars of liberation," is the most favorable tactic by which the expansion of Communist domination under existing world conditions can be achieved.

This new dimension of conflict poses new and changing problems for the free world and the United States. A basic premise of U.S. foreign policy, often stated by high Administration spokesmen, is that the security of the United States and the preservation of our fundamental values can best be preserved and enhanced within a community of free and independent nations. Such statements have further proclaimed that when the independence and progress of developing nations are threatened by Communist manipulation, the free world has a responsibility to assist nations so threatened in order to provide them an opportunity to determine their own future and advance in independence. These convictions form the basis for the concept of "counterinsurgency"—a term which is currently heard with increasing frequency throughout the defense establishment and other governmental departments and agencies. This reflects the Administration's continuing emphasis on an effective program that will (a) assist free nations, including newly emerging and developing ones, to progress economically, socially, and politically; and (b) ensure that the independence of these countries is maintained, by assisting them in the prevention or defeat of Communist inspired, supported, or directed insurgency.

Our analysis of the counterinsurgency problem commences with an examination of insurgency itself, both in the traditional sense and as approached by the Communist leadership. The succeeding brief appraisal of the post-World War II experiences of some of our allies with Communist-led insurgency will then give perspective to current United States counterinsurgency policies.

Insurgency in Its Traditional Sense

Insurgents have been defined as "organized bodies of men who, for public political purposes, are in a state of armed hostility to an established government."[1] Insurgency has been further defined as "a condition resulting from a revolt or insurrection against a constituted government which falls short of civil war."[2] This form of rebellious action has long been resorted to as a means for changing government. Our own Declaration of Independence, after listing "certain unalienable Rights," states that: "... whenever any Form of Government becomes destructive of these ends, it is the Right of the People to alter or to abolish it, and to institute new Government ..." Thus insurgency, in its traditional sense, is neither new nor startling as a political instrument.

Modern history provides many examples in which conditions of political suppression, economic dissatisfaction or exploitation, and the denial of social aspirations, in various combinations, have fostered insurgent or revolutionary actions or rebellions against established governments.

The American Revolution. Until 1763 the colonists showed little dissatisfaction with British rule, as they materially benefited from their imperial connections—access to large markets, protected production, and the physical security provided by British military forces. However, when the British attempted to recoup the cost of the French and Indian War at the expense of the colonists, the seed of revolution was planted.

Enforcement of the Navigation Acts and enactment of other burdensome legislation by the British Parliament created the "taxation without representation" issue raised by Patrick Henry and his associates in the Virginia House of Burgesses. Support for this position grew in many of the colonies. Subsequent coercive political measures and further taxation by the British increased the momentum of colonial

dissatisfaction. The colonists demanded the rights of Englishmen, but satisfaction of these demands was not forthcoming. Rather, the government of George the Third continued its repressive policies with additional sanctions against the colonies, thereby creating fertile ground for rebellion. The leadership and organization for revolution took shape in the various colonial assemblies and the Continental Congresses. By 1775 conditions were ripe for revolution.

The French Revolution. During the latter part of the eighteenth century the French populace was steadily repressed by the monarch and the nobility. The unequal tax structure, requiring payments approaching 80 per cent of the peasants' annual income while the nobility bore little or no share, created mass ferment. Imprisonment without cause and execution without trial were common occurrences. These conditions, when combined with the example of the American Revolution and the spark provided by revolutionary writers advocating "liberty and equality," raised popular indignation to a point where revolution was considered the only recourse.

The Mexican Revolution. The roots of the Mexican Revolution of 1911 may be traced to the century-long history of Spanish rule. The feudal system of land tenure established during that period resulted in gross maldistribution of land holdings. On the eve of the revolution about 1 per cent of the population owned approximately 70 per cent of the country's land.[3] Furthermore the dominant position of the Roman Catholic Church, attained under Spanish rule, was resented by many, who believed it to be an arm of the government for preserving the status quo. These factors, plus the indignation created by the encouragement of foreign economic penetration by the Porfirio Diaz regime and his ruthless suppression of criticism and demands for reform, combined to produce a genuine nationalist uprising. This ultimately led to sizable agrarian, labor, religious, and social reforms. Here, as with the revolutionary writings in France, the aspirations of the downtrodden were crystallized in the writings of the revolutionary leader Francisco Madero, who demanded reforms and free elections.

These instances illustrate some of the major underlying factors that historically have created popular unrest which, when given the spark of hope and capable leadership, has resulted in successful insurgent movements. Since World War II yet another factor has been imposed—the attempt of alien forces to provide this spark and leadership subversively so as to exploit unrest for the purpose of expanding their sphere of domination in this bipolar world. Essential to a comprehension of such subversive insurgency—that which is primarily Communist inspired, supported, or exploited—is an examination of the Communist approach.

The Communist Approach to Insurgency

The origin of the current Communist approach to insurgency may be traced to the ideological foundations and evolution of the communist doctrine itself. The nature of this doctrine demands that even such recent statements as the cited one by Khrushchev be formally based upon the theory of the communist prophet Karl Marx and its subsequent development.

In the mid-nineteenth century Marx combined the dialectic of the German statist philosophers with his economic interpretation of history to attempt an explanation of the dynamics of social change. In his view, capitalism—the prerequisite stage to socialism and eventually to communism—was the root of all social evils. During the period of capitalism, man's scientific and technological capacity ("forces of production") would outstrip social, legal, and political institutions ("relations of production") to the extent that social change would be brought about by uprisings of the exploited class and the resultant overthrow of those reaping increasing profits from technological advances and exploitation of labor's input to production. Imperialism, he explained,

was only the result of economic interests and rivalries within the capitalistic world. Although this theory was wholly materialistic and demonstrated little insight into the importance of nonmaterial factors and institutional flexibility in Western society, it was to become the dogma of the Union of Soviet Socialist Republics and the proclaimed basis for the international Communist movement.

Thus, from its inception, Russian Communism has been based upon the urban proletariat, which was, in Marx's mind, the downtrodden product of capitalism. It was not long, however, before the Bolshevik leaders, seeing little acceptance of their doctrine in the West, realized that the spread of Communist domination could best be achieved through the less-developed areas of the world. But here there was an obvious conflict: How could the Communist development take place in areas that had not experienced the capitalistic prerequisite? Lenin resolved this conflict in 1921, in attempting to make a reason for Communism in Asia, by declaring that Western imperialists were using profits from the Asian masses to prevent proletariat uprisings at home and that this in turn prevented the development of capitalism (and the resultant urban proletariat) in Asia. Therefore, by typical Communist "logic," the intermediate stage of Marxian development—capitalism—was bypassed, and the doctrine was stretched to meet Soviet objectives in the less-developed world.

However, Russian Communist leaders were far from adroit in their early tactics in these areas, their failure in China being among the most noteworthy. Stalin's "bloc within" strategy (an early attempt to gain control of the nationalist Kuomintang party through tactics of infiltration by the Chinese Communists) and other Moscow-directed efforts to promote urban uprisings failed miserably, leading to the total expulsion of the Communists from the Kuomintang and their eventual retreat into the mountains of Kiangsi Province in 1927.

Communist China. A highly significant development in the Chinese Communist approach toward insurgency then occurred. During the winter of 1927–28, Mao, together with his military commander, Chu Teh, organized rural guerrilla forces and created "soviets" in areas under his control *without* Comintern sanction. More important, Mao reasoned that a successful mass revolution in China could only be based on the peasantry rather than on the urban proletariat as envisaged by Marx. This "heresy" cast the Chinese Communist Party as a *unifying* force of *national* character operating throughout the agrarian countryside, and the image of an externally controlled movement pursuing a fragmentary class struggle was thereby removed from the Chinese Communist Party.

The subsequent development of Maoist strategy has been described as "the imposition of a political party organized in accordance with Leninist principles and animated by certain basic tenets of Marxism-Leninism onto a purely peasant mass base."[4] As components of this strategy, Mao fused a strong mass base, a well-organized political party with leadership along Leninist lines (small and well unified), a Red Army, guerrilla-trained and expert in the recruiting of new troops, and a strategically located, self-sufficient territorial base of operations. Mao insisted on a close interrelationship between guerrilla warfare and political objectives, while emphasizing the necessity for combining these with the mass base. He later wrote:

> Without a political goal, guerrilla warfare must fail, as it must if its political objectives do not coincide with the aspirations of the people and their sympathy, cooperation, and assistance cannot be gained.[5]

In 1929 Mao stressed the necessity for political mobilization of the masses and the responsibility of his Red Army in this regard:

> When the Red Army fights, it fights not merely for the sake of fighting but to agitate the masses, to organize them, to arm them, and to help them to establish revolutionary political power; apart from such objectives, fighting loses its meaning and the Red Army the reason for its existence.[6]

Throughout the rigorous years following 1935—commencing with Mao's legendary

"Long March" retreat to Shensi Province, during the United Front with the Nationalists against the Japanese invaders, and culminating with the post-World War II Nationalist-Communist struggle—Mao continually demonstrated an appreciation of the potentialities of revolution that existed in China. Realizing that the peasant was the key to successful take-over, he achieved firm political control of areas that had been occupied militarily and, while following a strategy designed to appeal to the impoverished peasant, ceaselessly pursued efforts toward political indoctrination of the populace. Therefore, while the peasant for the first time in Chinese history began to feel that he had a stake in his society, he was simultaneously being mobilized to the cause of the Chinese Communist Party.

Mao insisted upon a rigid discipline and a "unity of spirit" between his troops and the local inhabitants in order to ensure the acceptability of his Red Army throughout the countryside. The rigid guidelines for the personal conduct of Mao's troops—his famous "Three Rules and Eight Remarks"—emphasized the significance assigned to this relationship:

> *Rules:* (1) All actions are subject to command. (2) Do not steal from the people. (3) Be neither selfish nor unjust.
> *Remarks:* (1) Replace the door when you leave the house. (2) Roll up the bedding on which you have slept. (3) Be courteous. (4) Be honest in your transactions. (5) Return what you borrow. (6) Replace what you break. (7) Do not bathe in the presence of women. (8) Do not without authority search the pocketbooks of those you arrest.[7]

Mao's guerrilla tactics were expressed in a series of lectures delivered in 1939 entitled *On the Protracted War*. Given adequate time and space, he maintained, a properly conducted revolutionary war has a predicted outcome, and in addition its conduct must pass through three clearly defined stages. First, the strategic defensive, during which the guerrillas withdraw, when the enemy is committed to a quick war and will strike with as much power as possible. When a sense of futility creeps up both among the enemy's troops and on his home front, the second stage, stalemate, commences. Here guerrilla warfare is supplemented by harassment and mobile warfare, fought by increasing numbers of regular Communist troops. Finally, as this stage moves toward culmination, guerrilla warfare becomes merely supplementary, and an all-out shift to the strategic offensive is made.

The Chinese Communist victory in 1949 was a classic application of these tactics. In 1946 the Communists reverted to Mao's first phase. Nationalist forces made spectacular advances during the first year, but Mao was only trading space for time. In Manchuria he was organizing and arming a strong force to be utilized in the second phase. When the Nationalists made an all-out assault on the Communist capital of Yenan in 1947, they had unwittingly played into Mao's second stage. Overextended Nationalist armies were soon submerged in Red-controlled areas. The third phase, starting in 1948, was pursued with little difficulty. Nationalist morale broke down, and as the Communists advanced they organized the peasants to support their forces. As Mao's peasant base was expanded, the momentum of his attack grew, and soon there was little question of the eventual outcome.

Mao's strategy and guerrilla tactics proved to be highly effective in the take-over of China by the Chinese Communist Party. This accomplishment in the absence of Russian control, the national character of the Chinese Communist Party, and Mao's deviation from Marx's urban proletariat as a revolutionary base are indeed noteworthy, especially in the light of more recent Moscow-Peiping tensions. But of equal significance is the influence of the Chinese experience on other, more recent attempts to extend the sphere of Communist subjugation in the less-developed areas of the world.

Indochina. Following World War II, Vo Nguyen Giap, commander of the Vietminh army, accepted Mao's concept of revolutionary warfare as the theoretical basis for his struggle against the French in Indochina. In Giap's *The War of Liberation and the Popular Army*, published in 1950, Mao's concept of a three-

stage revolutionary war was applied, with some modification, to the characteristics of Indochina. Though the Maoist doctrine was more flexibly utilized here than in China, Giap and his lieutenants demonstrated an early appreciation of the applicability of the Chinese experience to their conflict. As had been done in China, they gave major priority in the Vietminh strategy to winning the people to the revolutionary cause and politically indoctrinating them.

The first stage of Giap's strategy has been described as the period from 1945 to 1947, during which the Vietminh utilized both tactical retreat in the south and cease-fire agreements in the north to gain time in which to pursue training of their military forces, organizing of disciplined political cadres, and the furthering of popular support.

The second stage commenced between 1947 and 1949, when guerrilla harassment was stepped up. By 1950 a large percentage of the French forces was committed to defense of fixed bases, and the intensified attacks of stage three were soon to begin.

Though the stages were not as clearly distinct as during Mao's Chinese take-over, the guiding principles for both these Communist leaders were quite similar. Final victory was ensured for the Vietminh with the surrender of the French garrison at Dien Bien Phu in April 1954.

Giap was willing to accept heavy losses at Dien Bien Phu to ensure a victory that would have a positive impact on French morale both at home and in Indochina, thereby weakening the position of France at the multilateral conference which was soon to convene at Geneva to resolve Asian problems. This timely evaluation resulted in success for Giap's indigenous application of Mao's theories and demonstrated the importance of subordinating military considerations to political ends.

Cuba. In recent years still another Communist theoretician has echoed Mao's philosophy of Communist revolutionary warfare—this time in Cuba. Ernesto "Che" Guevara's *La Guerra de Guerrillas* is virtually an imitation of Mao Tse-tung's writings, providing little new thought on the subject. This book does, however, provide a strong indication that the leaders of the Cuban revolt accepted Mao's tactics, his emphasis on political mobilization of the populace, and the value which he assigned to a strategically located base of operations. Guevara further adapts this pattern of Communist domination to Latin America by maintaining that a revolutionary situation may be *created*, that it is not necessary to wait for revolutionary preconditions to arise. However, the most significant fact concerning Guevara's guidebook is its widespread circulation within Latin-American revolutionary groups—an open manifestation of the growing penetration in the Western Hemisphere of Maoist principles for Communist exploitation of the conditions which have traditionally fostered insurgency. There is little doubt that such conditions exist in large parts of that region today.

In the Communist approach to insurgency, the Chinese experience has doubtless created the most significant impact. Both Giap and Guevara have practically accepted Mao's guidance *in toto*, with only minor indigenous modifications.

> . . . Soviet experience in 1941-44 (and 1918-20) is not really relevant to the current problems of Communist revolutionary war. In Russia, guerrilla warfare was supplementary and distinctly subordinate to the actions of regular armies. . . . Communist revolutionaries today are aware of this inapplicability of the Soviet experience. . . . While Mao in the 1930s paid tribute to the Russian experience and to the theoretical contributions of Lenin and Stalin, he stressed that they could not simply be transferred to the Chinese scene. . . .[8]

Though the Moscow leaders of international Communism are certainly reluctant to declare Peiping to be the guiding agent on revolutionary war within the Communist bloc, Khrushchev's aforementioned proclamation of Communist support for so-called "wars of liberation" could be interpreted as a tacit admission of this fact. For whether he likes it or not, China, Indochina, and Cuba are the only

countries where Communist insurgencies have succeeded since 1948, China providing the pattern for the other two.

This, then, is a major threat which the free world must meet—one which has required a re-examination of our capabilities to defeat Communist inspired, supported, or directed insurgency, planned and conducted within the dimensions of Mao's protracted war.

The Free World's Approach to Communist Insurgency

Today we view the problem of preventing indirect Communist subjugation with some advantages of hindsight, as valuable lessons have been learned from the post-World War II experiences of our allies in combating Communist-led insurgencies. The ill-fated French experience in Indochina (1945–1954), the successful anti-Communist campaign of the British in Malaya (1948–1958), and the national victory of the Philippine government in defeating the Communist Huk insurgents (1945–1954) are probably the most significant.

Indochina. In Indochina the Vietnamese desire for independence—born long before World War II, intensified during the war, and erupted into overt demands and resistance to the reimposition of French rule in 1945—remained throughout as the predominant basis for the conflict. Politically, the French refused to make genuine compromise with the growing expressions of nationalism. The Communists, on the other hand, directed these nationalistic feelings toward their own ends and assumed the leadership of the rebellion. An observer in Indochina in 1951 reported that "nobody on the democratic side of the world knew how to take a patriotic movement away from its communist leadership."[9]

While the French civil administrators were failing to recognize the growing strength of nationalism, their military leaders were demonstrating little understanding of the nature of their enemy or the importance of gaining widespread support of the indigenous population. As reported at the time, "the French have not been able to present, by politics or by propaganda, a victory that made sense to the common people. . . ."[10] Nor were flexible counterguerrilla operations seriously applied against the Vietminh. Another evaluator of French military tactics observed:

> It cannot be denied that a certain 'Maginot Line' or 'wall psychology' spirit had developed in the French High Command. More than 10,000 forts, bunkers, and concrete emplacements, totaling more than five million tons of concrete, were built in and around the delta. The whole tactical concept was built around the theme of *hold that line.* Costly battles were fought for the possession of these forts while their occupation—at one squad per fort, and many have company strength—immobilized at from 120,000 to 140,000 troops. And by no means do those forts prevent the infiltration of Vietminh elements! Battles involving nearly a whole Vietminh division were fought last year well within the fortified line and conservative intelligence estimates place the number of Vietminh troops operating within the delta at around 30,000 men.[11]

The subsequent success of the Vietminh demonstrated the ineffectiveness of such an approach toward this type of insurgency.

Malaya. In contrast to the experience in Indochina, the British and Malayan governments combined political, social, economic, and psychological actions with effective military tactics to defeat Communist insurgency during the decade following 1948.

The initial Communist objectives—to gain control of the peasants in remote villages, to solidify these areas as bases of operation under *de facto* Communist political control, and to form effective military elements—were soon apparent to the British. Their first order of business, therefore, was the isolation of Communist guerrilla forces from the civilian populace—protecting the civilian community from Communist terrorism, severing logistic links between the guerrillas and their indigenous supply sources, and disrupting efforts of Communist political indoctrination. In addition to the fortification of selected villages, large-scale resettlement programs were initiated to combine many of the sparsely settled, vulner-

able peasant groupings into viable areas of improved resources and facilities. Many of the peasants were given, for the first time, title to land and were provided protection to pursue a peaceful and improved way of life. Politically, this land-reform program contributed toward a reorientation of thinking among the people who had hitherto comprised the most unstable and least reliable element of the civilian population.[12] Civilian morale and confidence in the government rapidly improved.

Militarily, the British at an early stage abandoned the use of battalion-sized forces and adopted tactics which, while utilizing small, independent units in effective counterguerrilla operations, took the offensive into the Communist-held areas. A communications system was developed which led to a high degree of coordination of these units, contributing to the ultimate success of the over-all military effort. The tables of political indoctrination were turned when beleaguered Communist guerrillas—largely removed from indigenous sources of supply and under constant military pressure—were offered amnesty and political rehabilitation if they would surrender. Many accepted the offer.

By 1957 all effective resistance to the legitimate government had ceased, and Malaya was granted full independence.

The Philippines. Immediately following World War II, Communist-oriented Hukbalahap (Huk) guerrillas commenced overt action aimed at creating further turmoil for the newly independent Philippine government, which was still engrossed in recovery efforts. The Huk's initial objective was to win the allegiance of the rural population through exploitation of postwar economic and social impoverishment. The Huk slogan, "Land for the landless, equal justice for all," proved attractive propaganda.

Until 1950 the Huks were met with conventional military tactics. Though government forces greatly outnumbered the Huk insurgent guerrillas, attempts to subdue them proved largely ineffective. Popular support for the Huks actually increased. The situation by mid-1950 was so serious that, as one writer observed, "those whose attitude toward government and Huks alike could be expressed as 'A plague on both your houses' far outnumbered those who favored and supported either side."[13]

It was at this critical juncture that Ramon Magsaysay, on becoming Secretary of National Defense, vowed to win the allegiance of the populace to the Philippine government and rid his country of the insurgents. The Magsaysay program had three major points: (1) aid, assistance, protection, and just treatment for the peasants; (2) relentless military pressure on the guerrillas; and (3) amnesty and resettlement for the guerrillas and their supporters. Magsaysay clearly instructed the armed forces that the primary task of each member was to assist directly in defeating the Huks; when not so occupied, military forces were to aid the populace by building schools, roads, hospitals, etc.

As in Malaya, the fusion of substantial political, economic, and social reforms with effective counterguerrilla operations resulted in renewed popular allegiance to the government and increased isolation of the Communist insurgents. The Huks, faced with the withering away of indigenous supply sources, assistance, and intelligence information, had only the alternatives of surrender or death. Most chose the former, and by 1954 this attempted Communist take-over offered no serious threat to the maintenance of Philippine independence.

Of these selected examples, the Indochina experience demonstrated that military measures unaccompanied by efforts to meet growing popular demands are ineffective against Maoist-type insurgencies aimed at achieving mass support through the exploitation of these demands. The Malaya and Philippine examples illustrate successful measures that resulted in the defeat of Communist insurgencies, brought about by broad governmental programs based upon an awareness of the rising expectations of the people in these developing areas. Here, through measures of political, economic, and social improvement, an environment was created in which legitimate popular expectations could be successfully pursued in freedom. To support these efforts, military measures were adopted that

would, while meeting and countering the Communist guerrillas on their own ground, prevent disruption of efforts toward orderly progress.

United States Policies

The indirect threat to the security and independence of free nations posed by Communist efforts to exploit unstable conditions in newly emerging and developing nations—under the guise of "wars of liberation"—provides the United States yet another challenge for its policies. That the Sino-Soviet Communist leaders envisage a protracted conflict has been indicated by the foregoing discussion, and it is apparent that our security commitments must be expanded to this new dimension. As stated by Secretary of Defense McNamara:

> We shall have to deal with the problems of 'wars of liberation.' These wars are not wars at all. In these conflicts, the force of world communism operates in the twilight zone between political subversion and quasi-military action. Their military tactics are those of the sniper, the ambush, and the raid. Their political tactics are terror, extortion, and assassination. We must help the people of threatened nations to resist these tactics by appropriate means.[14]

Our assistance to nations threatened by Communist insurgent action is not solely based on idealistic foundations. It is also in our interest that free institutions prevail. In this regard the national objectives of the United States are succinctly set forth in a 1962 statement of policy by the Department of State:

> A basic premise of U.S. foreign policy is that the security of the U.S. and its fundamental values and institutions will best be preserved and enhanced as part of a community of free and independent nations. These nations should be characterized by economic growth, political responsibility and social justice in their economic affairs and a due respect for established international behavior in their foreign relations. In this regard, the U.S. is endeavoring to assist newly emerging and developing nations to maintain their freedom and independence and to deal effectively with their problems.[15]

The statement notes the requirement for an orderly developmental environment:

> The U.S. believes that the processes of development and nation-building should be aided and encouraged but not manipulated by outside forces. The creation of a relatively stable international environment within which economic growth can occur and free people are able to determine their own form of government is therefore a primary U.S. objective.

In defining United States objectives concerning protection of the developmental process, the statement continues:

> The achievement of this objective, however, is being challenged by an alien force which advocates and actively pursues the subjugation of free nations through subversion, insurgency and other means of indirect aggression.
>
> The primary responsibility for preventing or combating internal aggression rests with the threatened country. It is the policy of the U.S. to assist threatened nations, when requested, to prevent or defeat communist inspired, supported or directed insurgency in order to ensure that all nations—especially those newly emerging and developing states—are given the opportunity to determine their own future.

In pursuit of these objectives, Secretary of State Rusk has defined our strategy as twofold and interacting: "We must encourage the less-developed countries to move forward on their own as smoothly as possible and we must simultaneously assist in defending them against the threat of subversion." Regarding the implementation of this strategy, Rusk added:

> . . . this strategy requires new insights and techniques. We must become guardians of the development process rather than custodians of the *status quo*. We must be pro-modernization as well as anti-Communist. Our programs and resources must reach and affect the well-being of the whole society, rather than a privileged class only. We must coordinate our military assistance and economic aid programs so that they reinforce each other in a way that enables local governments to defend themselves from the enemy within.[16]

Current United States assistance to the

government of South Vietnam is founded upon these premises. At the request of the Vietnamese government, the United States is providing material and experienced training personnel to assist in defeating the Communist guerrilla forces. While the tactics successfully used in Malaya and the Philippines have not been rigidly duplicated (each insurgency presenting its own peculiar problems), similar concepts have been adopted. Since *people* are the key to this struggle, access to the villages is being denied to the Communists by the formation of "strategic hamlets." People have been resettled in selected villages where medical, educational, and basic economic facilities are provided within a protected perimeter. Meanwhile, in an attempt to create an environment in which true progress can be attained, the United States in giving economic and technical assistance to the Vietnamese government to reduce structural weaknesses in this developing country. Concrete accomplishment is a primary goal, for only visible results will ensure continuing allegiance to the independent government and continuing popular rejection of Communist propaganda. The primary burden of success or failure falls upon the local populace and their government, for in the final analysis only they can determine their own future.

Thus, as with the earlier Malayan and Philippine experiences, military measures, although essential, are only a part of this counterinsurgency campaign. As noted by Under Secretary of State George Ball:

> Without [social and economic] progress there can be no permanent success, for an unstable society is a fertile soil for insurgency.
>
> The response to the communist threat in Viet-Nam can not, therefore, be limited to military measures, no matter how well conceived and conducted. The Government in Saigon is aware that in the long run, victory will be won or lost in the villages and cities and in the minds and hearts of men.[17]

While the United States' counterinsurgency effort in Vietnam, because of the immediate nature of the threat, places heavy emphasis on both antiguerrilla operations and developmental efforts, this does not provide a rigid guide for the implementation of such policies elsewhere. In other developing countries, where conditions are such that insurgency may be in an insipient or latent stage, economic and social progress through developmental efforts must be more actively pursued, while military assistance should be primarily channeled toward such activities as training indigenous security forces and stimulating civic action programs (e.g., building of highways, schools, hospitals). Here the objective must be to assist friendly governments in removing conditions that could foster active insurgency.

The new concept of counterinsurgency is therefore much broader than merely the defeat of overt Communist guerrilla uprisings. The *prevention* of Communist insurgency and the attainment of stability through progress are the goals of United States policies. Herein lies an opportunity for the forces of freedom to gain the initiative in the less-developed world.

THREE PRIMARY problems arise in the implementation of these counterinsurgency policies, all of which require serious and positive efforts toward solution.

- On the international level, difficulties exist in coordinating the efforts of the threatened country with those of the United States and the free world in both public and private relations. Such coordination across sovereign boundaries has demanded and will continue to demand penetrating and discerning application of the art of diplomacy at all levels of intercourse.

- Since effective implementation of counterinsurgency policies requires harmonious functioning of the various entities of our government (Departments of Defense, State, and Agriculture, Agency for International Development, USIA, and others), practical intragovernmental direction and cooperation must be a continuing goal. In addition, an effective partnership between the United States Government and American private busi-

ness operating in the less-developed nations should be pursued energetically to contribute toward the removal of conditions that are fertile ground for insurgency.

• The individual departments and agencies of our Government must be continuously prepared to implement effectively all national counterinsurgency policies. The defense establishment, for example, while possessing credible deterrent capabilities for general and limited war, must simultaneously maintain forces well trained and equipped for counterinsurgency operations.

These problems are, of course, continuing. No easy, all-inclusive solutions will be found, but if such difficulties are to be minimized, they must, in President Kennedy's words, be met with "imagination, resourcefulness, and spirit."

U.S. Naval War College

Notes

1. George G. Wilson, *International Law* (New York: Silver, Burdett & Company, 1935), p. 66.
2. Interdepartmental Terminology Committee, *Glossary of Counterinsurgency Terms* (Washington, 17 May 1962), p. 2.
3. George I. Blanksten, "Foreign Policy of Mexico," in Roy C. Macridis, ed., *Foreign Policy in World Politics* (Englewood Cliffs, N.J.: Prentice-Hall, 1962), p. 312.
4. Benjamin I. Schwartz, *Chinese Communism and the Rise of Mao* (Cambridge: Harvard University Press, 1951), p. 189.
5. Mao Tse-tung, *On Guerrilla Warfare*, trans. by Samuel B. Griffith (New York: Praeger, 1961), p. 43.
6. "On the Rectification of Incorrect Ideas in the Party," *Selected Works of Mao Tse-tung* (New York: International, 1954), Vol. 1, p. 106.
7. *On Guerrilla Warfare*, p. 92.
8. Raymond L. Garthoff, "Unconventional Warfare in Communist Strategy," *Foreign Affairs*, XL, 4 (July 1962), 570.
9. Paul M. A. Linebarger, "Indochina: The Bleeding War," in Franklin M. Osanka, ed., *Modern Guerrilla Warfare* (New York: Free Press of Glencoe, 1962), p. 251.
10. *Ibid.*
11. Bernard B. Fall, "Indochina: The Seven Year Dilemma," *Military Review*, XXXIII, 7 (October 1953), 30.
12. James E. Dougherty, "The Guerrilla War in Malaya," *U.S. Naval Institute Proceedings*, LXXXIV, 9 (September 1958), 46.
13. Charles T. R. Bohannan, "Antiguerrilla Operations," *The Annals of the American Academy of Political and Social Science*, CCCXLI (May 1962), 22.
14. Robert S. McNamara, "The Communist Design for World Conquest," *Vital Speeches*, XXVIII, 10 (1 March 1962), 298.
15. Memorandum to Deputy Assistant Secretary of Defense (ISA) from Deputy Assistant Secretary of State for Politico-Military Affairs, subject: "Statement of U.S. Overseas Internal Defense Objectives," dated 26 July 1962.
16. Dean Rusk, "Problems of Development and Internal Defense," *Foreign Service Journal*, XXXIX, 5 (July 1962), 6.
17. George W. Ball, *Viet-Nam: Free World Challenge in Southeast Asia* (Washington: Department of State, 1962), p. 17.

Tactical Air Control in the VNAF

(From data released by Hq 2d Air Division)

THROUGHOUT the Republic of Viet Nam hundreds of pockets of Viet Cong insurgents can be found in hidden jungle camps over the wet, steamy marshlands of the southern delta, up through the coastal plains of the central highlands, and on into the mountains of the north. There are no orderly battlefields. The Viet Cong strike when they sense a weakness in the defense or when they are sure of numerical superiority.

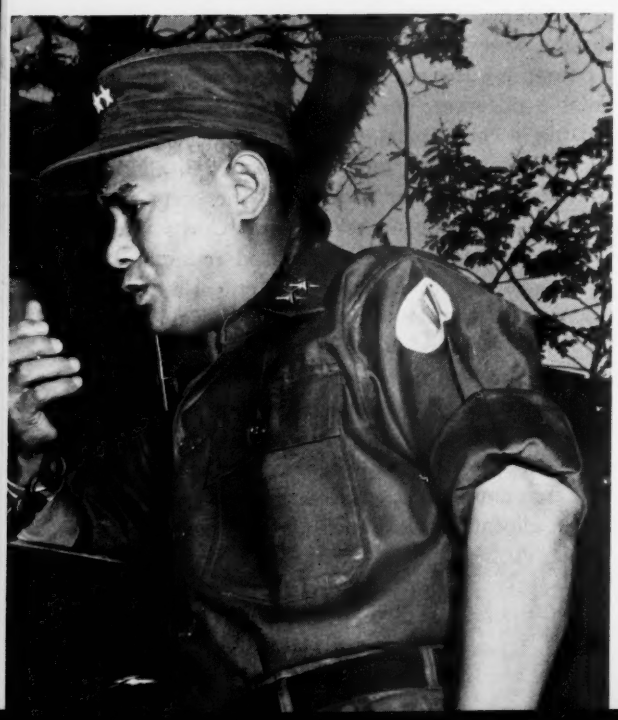
Warfare against these widely dispersed enemy bands uses best the tactics of the quickly vectored fighter-bomber attack, the vertical envelopment and the bombing strike on call, the aerial reinforcement and the aerial resupply. The air component of the defending forces must be under one central control for maximum utilization of the resources available, and the proved instrument is the USAF-model tactical air control system (TACS), under which the Republic of Viet Nam Air Force (VNAF) is operating with the guidance of U.S. Air Force advisers.

At the core of the system, functioning as the brain of the tactical applications, is the Joint Air Operations Center (JAOC), operating out of a squat, gray building at Tan Son Nhut Air Base, Saigon. From within the security confines of the JAOC emanate the orders for air cover, close air support, interdiction, reconnaissance, tactical airlift, and the many other modes of tactical air that the conflict in Viet Nam has adapted to its situation: the night flare missions, the low- and high-level aerial resupply, the day and night airlandings, the paradropping of special forces. First of all are the matters of priority of targets and the flexible economy of force applications. In Viet Nam the battlefield extends 700 miles north and south, 150 miles east and west. This broad "combat zone" requires immediate but exacting evaluation of strike priority and timing, especially when the strike aircraft available number fewer than 100.

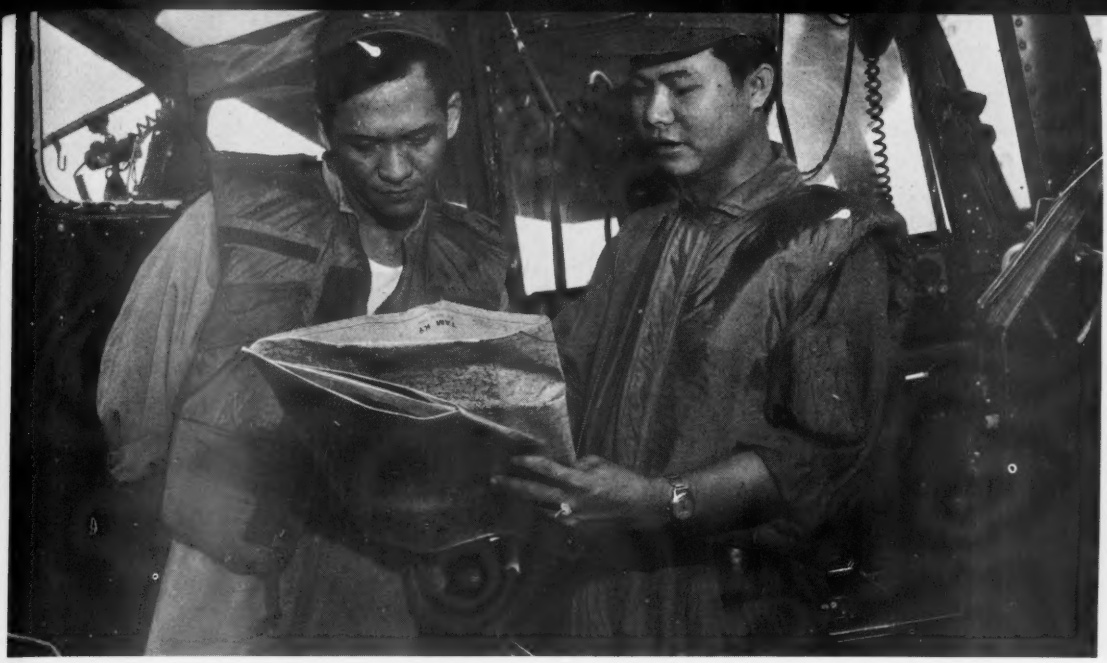
The JAOC is not monolithic. Branching from the central core at Tan Son Nhut Air Base are smaller nerve centers at Can Tho in the south, Pleiku in the central highlands, Da Nang in the north. A fourth is in the heart of Saigon. These air support operations centers, the ASOC's, are the channeling points for all Army of Viet Nam (ARVN) requests for air support, and their locations coincide with the four ARVN army corps headquarters. Each day the ASOC and the air liaison officer on the corps commander's staff analyze the field unit requests for the next day's air support. After targets are established, the daily aircraft allocation made to the corps by the JAOC is apportioned to the units on a priority basis. The terrain, kind of target, and the general ground-force situation dictate the type of aircraft committed and the ordnance load. It is also the JAOC that takes calls for help from villages or outposts under sudden attack and dispatches strike aircraft in response.

Thus we find that a centralized tactical air command and control system patterned on the doctrine and techniques developed in the USAF is again an optimum system in the Viet Nam counterinsurgency operations for maximum effective use of the available air forces. The over-all number of aircraft available in commission can be taken into continuing consideration by the JAOC planners in allocating sorties to the four ASOC's and the corps they serve. A large-scale operation by I Corps might become possible by well-considered reduction in another ASOC quota and reassignment of a part of its sorties for the day, or for a longer time if the operation developed need for continued strong air support. The flexible adjustment to varying needs could be made, if possible at all, only by time-consuming tactical conferences if the forces were rigidly and permanently divided among the four corps commands. At the same time the continuing flexible allocation of aircraft sorties under central

In a lonely country outpost a guard stands continually alert for any suspicious movement. This picturesquely roofed lookout point is typical of numerous posts throughout the Republic of Viet Nam, which protect local populations and flash the word of attack through a series of radio relays into the Viet Nam Air Force Joint Air Operations Center at Tan Son Nhut Air Base, Saigon.



Brigadier General Ton That Dinh, Commander III Corps, Army of Viet Nam, talks with fighter aircraft supporting his ground units by means of a mobile radio truck near the combat zone. The truck uses ultra-high, very-high, and single-side-band frequencies for ground-to-ground and ground-to-air contacts.



Viet Nam Air Force pilot and observer look over their route for the day to spot possible Viet Cong targets. Behind them ready for take-off is their one-engine L-19 aircraft, the eyes and ears of the VNAF. The L-19 is also used for liaison, convoy cover, and forward air control tasks.

control to the ASOC's allows the four localized centers the emergency calls from outposts in their regions under surprise attack. With authority to dispatch aircraft on a moment's notice, the ASOC can cut minutes out of reaction time, and a few minutes could mean the difference between an overrun hamlet and one successfully defended. It has been the almost immediate appearance of the VNAF that has discouraged the Viet Cong from more frequent attack on the remote garrisons.

The initial problem of reaching the air controller for air support of the isolated villages and military outposts was a communications problem, and USAF advisers helped the ARVN and VNAF plan a communications chain that has placed some type of radio equipment in the farthest locations of the defended areas. If an ARVN outpost commander is alerted to a possible assault on his position, he can quickly crank his portable radio and call for help. The first relay of his call reaches the district chief, who is the paramilitary leader in charge of the military Civil Guard and the Civilian Self Defense Corps in his district. The district chief in turn calls the province chief, another citizen soldier who has command over the four or five districts in his province. The province chief can then relay the call for help directly to the nearest army division headquarters, where an air liaison officer can be found. The last step is to put the request into the ASOC for strike aircraft. The ASOC will "frag" a couple of VNAF fighter planes into the air. Once airborne, they will be guided to the target by a forward air controller, the "FAC" who is above the besieged outpost in an observation aircraft.

By the time the fighters reach the target, the FAC has the situation analyzed as to the direction the Viet Cong are moving and the possible avenues of escape that they will attempt. The FAC brackets them with smoke bombs and keeps radio contact with the VNAF attack crews. The reports on these actions normally follow the same pattern. The Viet Cong break and run, and the outpost can relax. From the time of the first call until the planes arrive, the elapsed time will not exceed 30 minutes. If the Viet Cong attack should come at night, the outcome may be expected to be the same. VNAF C-47's flying the nightly airborne flare alerts will be above in minutes. Their 1,000,000-candle-power flares light up the target area to midday brilliance.

Two organized tactical air/ground operations conducted during the ten days that began 24 March 1963 displayed the effectiveness of the

A Viet Nam Air Force T-28 on call dumps its bomb load on a ground-identified Viet Cong ammunition dump and pulls out of its dive.

Quick he
call from
get last-m

Quick help via the Joint Air Operations Center. Responding to an urgent call from a village under Viet Cong attack, Army of Viet Nam paratroopers get last-minute instructions before the jump from a C-123 assault transport.

Hundreds of ARVN paratroopers float down from a C-123 V-formation into position to flush out a Viet Cong concentration. Vertical envelopment frequently kicks off the ground phase of tactical air/ground operations such as the Phi Hoa II Operation.

JAOC/tactical air control system, which concurrently continued to handle the normal daily variety of strike requests.* In the morning of the 24th a strong combined tactical air/ground vertical envelopment strike kicked off "Operation Phi Hoa II." Almost 1500 ARVN troops, 1150 parachuted and 320 airlanded by helicopter, were deposited in a pincer-type pattern around a reported large concentration of regional "hard core" Viet Cong regulars in the Duong Minh Chau war zone, Tay Ninh province, about 50 statute miles northwest of Saigon. VNAF close-support AD-6 fighter-bombers and two-engine B-26 light bombers worked over the paradrop and airlanding areas with fragmentation and antipersonnel bombs for ten minutes before the arrival of the troop-carrying aircraft and helicopters. The target area was pinpointed by a forward air controller U-10A plane. The Chief of Staff, Vietnamese Airborne Brigade, also flew in the FAC U-10A to mark the drop zone with smoke bombs shortly before the troop carriers came over. Escort and air cover for the troop-carrier aircraft were flown by two VNAF AD-6 fighters, and four VNAF T-28 fighters escorted the helicopters on their two lifts. Two VNAF B-26's and four AD-6's also flew air cover during the drop and landings.

Damage and casualties were light during the opening phase of the Phi Hoa II operation. Two C-123's were hit by ground fire en route to the drop zone but took only minor skin damage. No hits were reported during the drop maneuver. Eleven paratroopers were injured in landing in the drop zone, but ARVN commanders reported 24 Viet Cong had been killed by the softening-up preliminary strikes on the drop zone.

Air operations on the second day of Phi Hoa II featured close-air-support strikes and air cover for the ground forces, together with escorted combat-support missions by C-47 transports and helicopters. One C-47 psychological-warfare mission was flown. On the third day strikes were directed against Viet Cong concentrations and installations in the combat area. One VNAF B-26 and two T-28's hit a troop concentration 20 miles northeast of Tay Ninh with napalm, .50 caliber, fragmentation bombs, and general-purpose bombs. Four AD-6's and two T-28's hit various Viet Cong targets about 15 miles east of Tay Ninh, reporting three structures destroyed, ten damaged. Four L-19 FAC planes gave pinpoint target spotting and direction for the interdiction and close-support strikes.

On the fourth day B-26's and AD-6's flew cover for on-call strikes by the ground forces. Two B-26's hit interdiction targets in the combat zone, and another B-26 flew air cover for a large ARVN truck convoy moving through the area. The operations continued on the following day with T-28 fighters and B-26's flying air cover, interdiction, and close-support missions. By first report a strike of three B-26's against a Viet Cong concentration 15 miles northeast of Tay Ninh netted 14 enemy killed. Again all strikes were directed by FAC aircraft. Two U-10B's flew psychological-warfare loudspeaker missions over Viet Cong suspected locations. Headquarters 2d Air Division reported that to date the ARVN/VNAF Operation Phi Hoa II was judged highly successful. The ARVN ground forces had captured large amounts of weapons and ammunition, black powder, gasoline, and food stores, as well as a medical supply center, a complete ammunition factory with machinery, and a Viet Cong training center. On the sixth day ground forces were mopping up in the combat zone, assisted by air strikes on call.

In the meantime an operation nicknamed "Seven Mountains" that had begun two days earlier on 27 March was developing into a major operation. What had started as a small clash with the Viet Cong in An Giang Province 100 miles southwest of Saigon increased in tempo and proportions. Large numbers of Viet Cong were reported on the slopes of the southernmost of three mountains rising out of the flat delta country near Tri Ton. ARVN Special Forces had surrounded the mountain. Air strikes requested by the Special Forces had struck at several Viet Cong troop pockets lodged on the mountain slopes, and return fire was coming from these concentrations.

On 30 March as Phi Hoa II mopping up drew to a close, 12 VNAF T-28's and 4 B-26's responded to ARVN requests with a series of softening-up strikes while the ground forces continued to hold their perimeter defense around the base of the mountain. Large quantities of ordnance, including napalm, general-purpose bombs, rockets, fragmentation bombs, .50-caliber machine gun, and 20-mm cannon, were pinpointed into targets on the dense-

*See Daily Operational Summary, 24 March through 2 April 1963, Hq 2d Air Division, Tan Son Nhut Air Base, Saigon.

A Typical Day's Work

On 30 March 1963 the VNAF Tactical Air Control System flew 48 combat sorties in support of the ARVN ground forces. In addition to support for the major Phi Hoa II and Seven Mountains Operations, the missions described in the following excerpt from the Hq 2d Air Division Daily Operations Summary were dispatched.

In other areas of south Viet Nam, T-28's and B-26's flew air strikes against positively identified Viet Cong troop concentrations and installations. All were flown in response to requests from ARVN Corps area commanders. A pair of T-28's hit a VC installation 40 miles southwest of Da Nang destroying three structures, damaging three. Two B-26's struck two different Viet Cong installations 55 and 65 miles northwest of Pleiku, expending their complete line of ordnance. In the latter operation six structures were destroyed, while reports on destruction of the first target have not yet been confirmed. Two other B-26's attacked a Viet Cong camp 40 miles northeast of Pleiku, seriously damaging three of the structures. 30 miles west of Ban Me Thuot, two T-28's strafed a Viet Cong concentration of troops with rockets and .50 caliber machine guns.

Close air support was given the Vietnamese ground forces by one B-26 and two T-28's in VC daylight attacks on outposts 33 miles southwest of Soc Trang and 15 miles northeast of Phan Thiet. While Viet Cong casualties are not known in either attack, both attacks were broken up and the outposts saved.

Sixteen L-19 aircraft provided forward air control duty in all Corps areas. Near Da Nang one L-19 escorted a freight train. Another L-19 served as forward air control on a T-28 fighter air escorted truck convoy from Qui Nhon to Pleiku. In the Ca Mau peninsula of the delta an L-19 escorted a Vietnamese Navy Supply and Troop Ship.

On-call air cover was provided a ground operation in IV Corps about 5 miles northwest of Tri Ton by a VNAF B-26 light bomber. No ordnance was expended by the B-26.

Armed reconnaissance by two T-28's and two AD-6's was flown between Ban Me Thuot–Da Nang and Nha Trang–Tan Son Nhut. Both were III Corps army requested missions.

Air escort cover for a ground force truck convoy in the Ban Me Thuot area was flown by a U-10B while six T-28's provided fighter cover for a ninety-nine truck convoy in the Qui Nhon–Pleiku area.

In night air activities one VNAF C-47 flare ship and two T-28 fighter-bombers flew a well-coordinated night flare strike against Viet Cong forces attacking an outpost 15 miles southeast of My Tho. The C-47 dropped 54 flares while the T-28's bombed and strafed the attacking VC force. Results of the strike were not known; however, the air attack drove the Viet Cong away and the outpost was saved. Another C-47 flew airborne alert in the Saigon area.

A total of 48 combat operational sorties were flown today thru the tactical air control system in support of ground forces: 16 air strikes, 19 close air support: nine air cover, and four escort to helicopters.

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ly foliated slopes by the tactical fighters and bombers. VNAF forward air control planes spotted and directed all strikes. Results were still unknown, as the ARVN forces had not yet entered the strike area. In addition to the Seven Mountains and the Phi Hoa II operations, numerous other sorties were flown as usual on this same day, which afforded a representative specimen of the daily work of the tactical air control system (see above excerpt, Daily Operational Summary of 30 March).

On 31 March the softening-up strikes went ahead in the Seven Mountains operation, and a few strikes continued in the Phi Hoa II operational area. On the following day low ceilings and heavy haze enveloped the Seven Mountains area, limiting the work of the FAC L-19's in positive identification and marking of the Viet Cong concentrations and targets. One flight of B-26's struck a Viet Cong pocket at Special Forces request. Five VNAF T-28's, six AD-6's, and several B-26's flew air cover in the area for on-call strikes but returned to their bases with ordnance unexpended because of lack of positively identified targets. A U-10B flew several photo reconnaissance sorties over reported Viet Cong locations.

Nevertheless late in the day the Seven Mountains air/ground operation was concluded with the assault and capture of the mountain by ARVN Special Forces and ground troops. The actual capture of the mountain, named Phnom K To, took the ground forces little more than an hour after completion of several days of strikes in the air phase of the operation. Resistance was very feeble. Unconfirmed reports of the assault forces stated that 55 dead Viet Cong soldiers had been found. Among the key targets captured or destroyed were a Viet Cong munitions factory and a key headquarters.

The Seven Mountains area had been a Viet Cong stronghold for many years and had not been penetrated, either by Republic of Viet Nam forces or by the French in an earlier time, since 1947. Military air and ground observers praised the operation, stating that it solidly demonstrated the effectiveness of tactical air/ground cooperation in counterinsurgency tactics.

The efficiency of the tactical air control system in the Viet Nam Air Force is attested by the volume of sorties it handles. During 1962 more than 40,000 operational sorties were flown in support of the Army of the Republic of Viet Nam. In the first quarter of 1963 the tempo of operations increased to 14,000 sorties by aircraft in the inventory of the Joint Air Operations Center, an annual rate of 56,000 sorties, or more than 1000 sorties per week.

Air University Review

UNITED STATES MILITARY ASSISTANCE TO LATIN AMERICA

CAPTAIN DAVID H. ZOOK, JR.

UNITED STATES military policy in Latin America has passed through various evolutionary stages. On the eve of World War II our country spearheaded the development of collective or hemispheric defense. While this policy was intended primarily to foster a strong posture relative to extrahemispheric threats, internal security against Axis subversion was also a consideration. Military aid, military missions, and invitations to Latin-American personnel to study in our professional schools were important aspects of the implementation of the policy. The program of advising, training, and equipping friendly armed forces carried with it cooperation with existing governments, whether military or civilian, representative or autocratic.

The cold war motivated continuing U.S. interest in the maintenance of military posture by the Latin-American nations. This interest was reflected in the Mutual Security Act of 1951. Military aid was resumed on a greater scale. Largely as before, the program at first aimed at enhancing the capability of our American allies to defend themselves against external peril. At the time, though, dangers from external sources admittedly were not great.

By 1961 the program was again undergoing change. The greatest threat was no longer from enemy armed forces but from domestic elements subverted by our international foes. Internal security has become the central focus. The U.S. Department of State reportedly desires the preservation of domestic stability so that the economic development program may prosper. If Communists or their allies subvert existing governments because of inadequate internal security measures, then, palpably, stability will be lost and economic aid will be rendered useless. Indeed the mere creation of domestic chaos through widespread terrorism can achieve the same result.[1]

Orderly constitutional governments are essential to economic and social development, and they require armed forces and police to maintain order. Consequently, according to the Secretary of Defense, the program for fiscal years 1962 and 1963 was basically designed to improve internal security, to promote civic action, and to enhance antisubmarine warfare capabilities.[2] Assistant Secretary of State for Inter-American Affairs Edwin M. Martin, in stressing the indirect Communist menace from Castro-promoted aggression, also has stated:

Countries must have forces capable of dealing with such insidious threats to their security. The military aid program this year emphasizes training and equipment designed to help Latin American forces strengthen this capability.[3]

Specifically, then, we are currently endeavoring "to provide the essential arms, transportation, and communications necessary to ensure that mobile and effective forces will be available to preserve internal security when called upon. Well-disciplined and well-trained Latin-American armed forces, led by men of moderate views, will provide the stability and degree of internal security which are necessary to economic and social development and to the success of the Alliance for Progress."[4]

contemporary considerations

Lieutenant General Andrew P. O'Meara, U.S. Army, Commander in Chief of the Caribbean Command, who has responsibility for our military assistance program in Latin America, has said that "each country has distinctive problems as well as assets and our assistance must be tailored to it." The greatest contribution that an individual republic can make to hemispheric defense and security "is to maintain its own internal security, since economic and social progress must be based on a foundation of security."[5]

We have built up select Latin-American forces that have U.S. training and equipment. Although originally they were intended for hemispheric defense and antisubmarine operations, they can also contribute to internal security. Therefore, they must have that primary responsibility until units specifically designed and equipped for that duty complete their training and preparation. Over the long term we need to fashion special forces to resist Communist threats, especially revolution of the Che Guevara type.

To combat activity in which weapons are brought in across beaches, patrol boats, paratroops, and airborne and specially trained infantry units are vital. They must be small, highly mobile, and specifically schooled in irregular or counterinsurgency operations. Where surface transportation is poor, air transport squadrons have a key role. Fundamentally, such troops must be tailored to the situation in each particular country for defense against guerrilla warfare and clandestine troop and materiel movements by sea or air.

The armed forces can also contribute to internal development through civic action. Their activities in public works, agriculture, transportation, and health are encouraged by us. Specific examples would include air transport and combat engineers such as Peru has so effectively meshed for the construction of roads into the Amazon hinterland. These routes make it possible to open for exploitation potentially wealthy regions which will have an important impact on the national economy. A similar operation is taking place in Ecuador under the self-help concept, which contemplates employment of military forces for internal development projects.[6]

methods

The key to all these efforts is in the Latin-American military personnel. Before a country can be subverted, the armed forces must be neutralized. Certainly the officer corps have changed markedly since the nineteenth century. Most members now come from the middle class and form a well-educated elite. Training in United States schools has given them significant exposure to U.S. attitudes and professionalism. Generally, they recognize the error of extremism, whether of left or right, and are staunchly anti-Communist and pro-U.S.[7]

These attitudes are inculcated in several ways. First, and perhaps most important, is U.S. education. Over 7500 officers and men have been trained in this country, and since World War II over 14,000 have passed through U.S. schools in the Canal Zone.[8]

Second in importance are the service missions. These are commonly responsible to both the host service and the U.S. military departments. One of the mission chiefs is designated Commander, U.S. Military Group, and is directly responsible to CINCarib. Attachés, on the other hand, are responsible to the U.S. ambassador in the country to which they are

accredited and to their respective military departments. The goals of the missions are several: self-sufficiency of the host service, supplying necessary outside military assistance and advice, standardization of military equipment, technical training in the field, and fostering close, friendly relations.[9]

The third method is joint maneuvers. These have been carried out in recent years by naval and airborne forces. In late 1962 Argentine and Venezuelan destroyers joined ours in the Caribbean. Additionally, air transport units have assisted in disaster relief and in moving heavy equipment into remote areas for engineering units. While perhaps not strictly in the category of military aid, such operations do add to the spirit of camaraderie.

assessment

Most important for our purposes are the results of the military assistance program in this hemisphere. Approval has not been unanimous, some critics having delivered serious charges. For example, Brigadier General Bonner Fellers (U.S. Army, Retired), in testimony before the House Foreign Affairs Committee, leveled his sights at the young Latin-American officers trained in the United States. "Upon their return home," he said, "their outlook changes. Their governments appear inadequate, sluggish, and antiquated. They find U.S. dollar handouts have bred corruption in high places. They form a clique separate and apart from others. Convinced that they could run their country far better than their present Chief of State, they plot his overthrow. With weapons and training which we have provided, they have the means to take over the government by force. Thus, our military assistance programs are creating potential military dictatorships."[10]

The respected Latin-American expert, Dr. Edwin Lieuwen, suggests that U.S. endeavors encourage the "Latin American officer corps to convert themselves into even more highly political instruments than they are already." He raises the question whether our program's emphasis on internal security stimulates abnormal social evolution.[11]

On the other hand, an editorial in *New Republic*, which could hardly be termed a militarist publication, supported the internal security focus and called the joint hemispheric defense concept "as outdated as cavalry." It endorsed an increase in U.S. funds for the military aid program and acknowledged that after his last tour of the area Adlai Stevenson raised his estimate of the Latin-American military.[12]

These contrasting opinions are interesting and deserve evaluation. General Fellers certainly seems too severe. There is no instance in which the circumstances he presents have developed. Quite the contrary. In a country plagued with chronic internal disorder and subversion, a young U.S.-trained pilot, when asked what should be the place of the Air Force in his troubled nation, replied: "On the Base where it belongs. We must leave government to the politicians and stop being the barracks of South America."

Although Dr. Lieuwen's fears are shared by many, they reflect what appears to be a lack of understanding of the basic political and social situation in much of the area. If we do not encourage internal security forces through military assistance, more Cubas may well occur. Certainly the events in Cuba could not be termed a "normal social evolution." Indeed, parenthetically, Castro has utilized extrahemispheric *enemy* military assistance on a large scale to impose a military dictatorship and to emerge as a *caudillo,* albeit of a new type, i.e., the Communist *caudillo.*

WE MUST RECOGNIZE that social and political attitudes in the Latin-American countries are quite different from our own. We shall not change them overnight, if ever. To attack military aid because the recipient peoples have attitudes toward the armed forces which vary from our own is rather myopic. We must learn to live with other friendly peoples in every respect. We cannot impose our social, political, or military ideas on them. We can only seek in the military realm to further the development of professionalism and *civismo.* In this our program is attaining reasonable success.

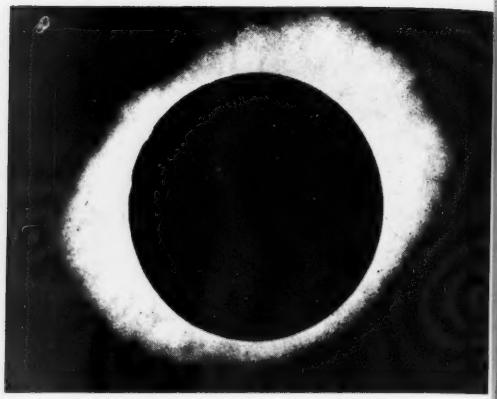
We therefore conclude that the military assistance program to Latin America, with its present emphasis upon internal security, civic action, and antisubmarine warfare, is intrinsically sound. While it may contain nascent undesirable features—which is by no means subject to proof—the consequences of its abandonment seem palpably more disadvantageous from the standpoint of the broad interests of the Western world.

United States Air Force Academy

Notes

1. U.S. Congress, House of Representatives, Committee on Foreign Affairs, *The International Development and Security Act*, Hearings, 87th Congress, 1st Session (Washington: U.S. Government Printing Office, 1961), Part II, 455, 460, 468.
2. U.S. Congress, Senate, Committee on Foreign Relations, *Foreign Assistance Act of 1962*, Hearings, 87th Congress, 2d Session (Washington: U.S. Government Printing Office, 1962), 60.
3. *Ibid.*, 403.
4. *Ibid.*, 406-407, testimony of General William Enemark, Director of Western Hemisphere Region, OASD (ISA).
5. *The International Development and Security Act*, Hearings, II, 451.
6. *Ibid.*, 451, 456; Edwin Lieuwen, *Arms and Politics in Latin America*, rev. ed. (New York: Praeger, 1961), 188-193; *Foreign Assistance Act of 1962*, Hearings, 77, 403, 407.
7. *The International Development and Security Act*, Hearings, II, 453, 463.
8. *Ibid.*, 452.
9. Colonel Frank L. Gailer, Jr., "Air Force Missions in Latin America," *Air University Quarterly Review*, XIII, 2 (Fall 1961), 46-55.
10. *The International Development and Security Act*, Hearings, II, 744.
11. Lieuwen, *op. cit.*, 231, 239.
12. "Arms for Latin America," *New Republic*, 145 (24 July 1961), 6-7.

Science Frontier



THE INTERNATIONAL YEAR OF THE QUIET SUN

MAJOR THOMAS D. N. DOUTHIT

DURING THE International Geophysical Year (1957–58), scientists through a worldwide cooperative effort accomplished an unprecedented and most significant achievement by increasing what had been a relatively limited knowledge concerning our planet Earth. The IGY was deliberately planned to coincide with a period of maximum solar activity, to help achieve the objectives of those research programs concerned with phenomena which are influenced by the sun. During the IGY the number of sunspots, considered an index of the intensity, density, and frequency of disturbances on the sun, greatly exceeded that of any like period recorded since the beginning of systematic observations some two centuries ago. As a result of this unusual solar activity and of observational techniques developed during IGY activities, the understanding of solar-terrestrial relationships is advancing to an extent exceeding the most optimistic expectations. The advances have led to discoveries of many new phenomena as well as rapidly increasing theoretical understanding of the generation and escape from the sun of charged particle streams, their propagation through interplanetary space, and their encounter and interaction with the geomagnetic field.

Although a very high level of solar activity was desirable during the IGY, the very nature of such activity greatly complicated the full disentangling of all the features of the sun-earth relationships. It has become quite clear that certain observations should continue through a period of *minimum* solar activity. The next period when sunspot numbers will have decreased to the lowest point in the solar cycle will be 1964–65. In other words the sun during this period will be relatively "quiet."

The present solar cycle, Cycle 19, began in April 1954 and is now well into its declining phase. The sunspot graph (Figure 1) presents the recent trend of Cycle 19 of the 11-year sunspot cycle and predicts the future level of activity of this cycle.

Initially, a few scientists informally began to plan a program called "The Solar Activity Min-

mum Program." At a meeting of the International Committee on Geophysics (CIG) of the International Council of Scientific Unions, held in Helsinki in August 1960, this program was discussed and a working group appointed to bring together the viewpoints of specialists in the upper-atmosphere and solar disciplines. At another meeting of the CIG, at Paris in January 1961, the program was officially adopted as a CIG-sponsored international program. The name "International Year of the Quiet Sun," or IQSY, was also adopted.

The CIG working group emphasized that IQSY "is not to be regarded merely as a smaller scale repetition of the IGY but it is intended that full advantage shall be taken of the new knowledge of solar-terrestrial relationship gained during the IGY and also of the improved and new techniques for geophysical research which have been and will be developed in the intervening years."

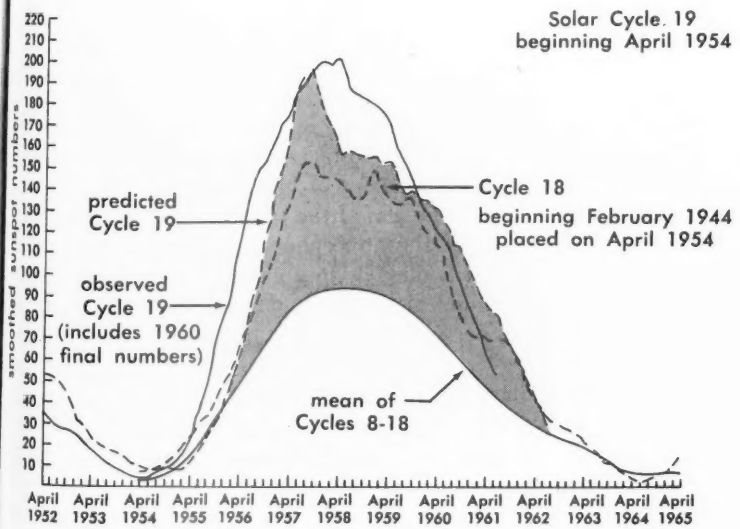
In March of 1962 scientists from 26 nations participated at the First IQSY General Assembly, at which time a provisional international program was developed and the following criteria were stated for the selection of IQSY projects: (1) studies which are feasible only at the time of solar minimum activity or are best undertaken at that time, (2) studies of isolated solar events that are not complicated by the superposition in time of any different effects, and (3) studies comparing data characterizing solar minimum activity with data referring to solar maximum.

International interest continued to grow, and in March 1963 the Second IQSY General Assembly convened in Rome. At this meeting final plans were formulated for the nature and scope of the program and the exchange of geophysical data via the World Data Centers that were established for the IGY and have continued to collect and disseminate data according to CIG recommendations.

The Committee for the International Year of the Quiet Sun has outlined the following general statement of the objectives and program in the IQSY disciplines. Detailed recommendations may be found in *CIG News* Number 5 (IUGG Chronicle Number 42).

(1) The meteorological program is designed to study the large-scale physical, dynamical, and thermodynamical characteristics of the atmosphere above the 100-millibar surface and the relations between the upper and the lower atmosphere. This study will include:

(a) The climatology of the upper atmosphere —the variation in space and time of the parameters of the state and motion of the atmosphere.



Predicted and observed sunspot numbers for the present solar cycle, Cycle 19. For comparison, Cycle 18 and the mean for Cycles 8–18 are shown. (Based on a graph prepared by Central Radio Propagation Laboratories, National Bureau of Standards.)

(b) The morphology of the disturbances in the upper atmosphere—the thermal structure and the horizontal and vertical flow patterns.

(c) The relation between stratospheric circulation and temperature field and the distribution of ozone and water vapor.

(d) Radiative processes in the upper atmosphere, particularly in relation to distribution of ozone and water vapor.

(e) The incidence and nature of clouds and aerosols in the upper atmosphere.

(f) The relations between solar activity and the composition, motion, and temperature fields of the upper atmosphere.

(2) Geomagnetic and earth-current observations during the IQSY are of paramount interest because the time variations of the geomagnetic field and the earth-currents are so sensitive to certain solar influences that they will give unique and continuous information on such influences during the interval of minimum solar activity. The IGY has provided excellent geomagnetic and earth-current data on conditions during a sunspot maximum period, but to draw maximum benefit from these data it is imperative to supplement them by observations at surface observatories as well as in space.

(3) The IQSY auroral program will provide an opportunity to complete the study of the dependence of the auroral zones on the solar cycle and the frequency of occurrence of different types of auroras. In addition, many special research projects can be carried out by taking advantage of the less complicated events of the minimum solar period. Advanced rocket and satellite technologies, improved ground instrumentation, and several kinds of closely coordinated observations at pairs of magnetically conjugate stations will also be used to investigate mechanisms of influx of particles and their interactions with the geomagnetic field and atmosphere.

(4) The study of the properties of the airglow as a function of the phase of the solar cycle will continue the program initiated during the IGY. In addition, owing to reduced auroral activity at solar minimum, it will be possible to study airglow at latitudes just equatorward of the auroral zones. It will be important too to follow up the discoveries made during and after IGY of such phenomena as the red arcs and to employ fully the new techniques offered by satellite and rocket technology and improved detectors.

(5) The ionosphere program is generally aimed at completing studies initiated during IGY of the dependence of ionospheric properties on the solar cycle, with the addition of special emphasis on certain investigations and techniques made possible by new technology and the quiet sun conditions. Important new work includes, for example, the sounding of the atmosphere to great heights using high-power radar, study of the exosphere through very low frequency (VLF) and extra low frequency (ELF) phenomena, and closer coordination between ground observations and measurements made *in situ* using rockets and satellites.

(6) The solar activity program will complete the intense study, begun in IGY, of the sun's behavior in the course of a solar cycle both in terms of solar physics and in relation to geophysical effects. Solar patrols, both optical and radio, will continue to provide not only the basic solar observations for understanding the nature of solar activity and its changes with time but also information needed for the designation of alerts and special world intervals planned for times of solar and terrestrial disturbances.

(7) The cosmic-ray program will investigate the emission of energetic particles by the sun at a time of minimum activity and study their mode of propagation through the interplanetary magnetic field. Further investigation will seek to learn the nature of the solar modulation processes at low levels of activity and the relation between the cosmic-ray intensity and the electromagnetic conditions in interplanetary space. Also studies will consider the energy spectrum and composition of the low-energy cosmic rays that are unable to reach the earth at times of high solar activity.

(8) The aim of the program on aeronomy (the study of the atmosphere of the earth and other spatial bodies) is to obtain a coherent picture of aeronomical processes during solar minimum, as this period is particularly appropriate for determining the value of physical parameters with precision. Such information is needed for calibration and reference purposes. Aeronomy problems require extensive data on pressure, density, temperature, mean molecular mass, concentrations of atomic and molecular species as well as positive and negative ions and electrons, and the absolute energy spec-

trum of incoming solar radiation, particularly in the X-ray and far ultraviolet regions.

As during the IGY, provisions have been made for special or intensified observations during certain days or periods that may be selected in advance (Regular World Days, World Geophysical Intervals) to give good representative seasonal coverage and sampling throughout the two-year period. Alerts and Special World Intervals will be called, depending on the occurrence of solar, upper-atmosphere, geomagnetic, ionospheric, or cosmic-ray events of special interest.

The fact that over 70 nations have volunteered to participate in the IQSY indicates the magnitude of the international coordination required for the program. The U.S.S.R. is anticipating extensive participation in all disciplines of the IQSY. The Soviet Geophysical Committee aims to ensure the greatest possible comparability of the IQSY observations with the observations made during the IGY by using the same stations to conduct observations. Information will be provided to the World Data Centers.

An example of special research planned by Soviet scientists is a cooperative effort planned with Norwegian, Swedish, and Finnish scientists in the study of local characteristics of magnetic variations and in determination of current systems, using an extensive network of magnetic observatories. Patrol satellites will be used to measure solar X-ray, ultraviolet, corpuscular, and radio emissions, as well as to conduct magnetic surveys and to record electron concentration in the upper atmosphere. Meteorological satellites will be used for spectrographic observations of cloud layers and variations of solar and terrestrial radiations. Other nations plan participation to a greater or lesser degree, depending upon their resources and availability of scientific personnel and equipment.

As part of the fundamental international planning for the IGY program, World Data Centers were established to collect data from the numerous and widespread IGY observational programs and to make such data readily accessible to interested scientists and scholars for an indefinite period of time. In order to guard against accidental loss of irreplaceable data and to make access as convenient as practicable, it was agreed that there would be duplicate centers for each IGY discipline in at least two (and for most disciplines, three) places in the world. Three World Data Centers were established: World Data Center A, divided by discipline among 11 institutions in the United States; World Data Center B, in 3 institutions in the U.S.S.R.; and World Data Center C, in 21 institutions located in 8 nations of Western Europe, in Australia, and in Japan. These same WDC's will be used during the IQSY. As part of the international data exchange, each WDC is required to supply, on request, at a cost not to exceed the cost of copying and postage, copies of material collected and also, by appropriate arrangements, to make this material available to scientific workers visiting the World Data Centers. Catalogs of data are published semiannually.

The United States program for the IQSY includes observations in all IQSY disciplines. Continuing research programs of relevance to IQSY include work undertaken or sponsored by the National Aeronautics and Space Administration, the Central Radio Propagation Laboratory (CRPL) of the National Bureau of Standards, the U.S. Coast and Geodetic Survey, U.S. Weather Bureau, the Naval Research Laboratory and the Office of Naval Research, the U.S. Army Ballistics Research Laboratory and Electronics Research and Development Laboratory, the U.S. Geological Survey, the National Science Foundation, and the Air Force Cambridge Research Laboratories and Office of Aerospace Research.

In a letter to the National Science Foundation, dated 14 September 1962, President John F. Kennedy authorized United States' participation in the IQSY and designated the NSF as the responsible agency to correlate the Federal Government's regular activities that contribute to the program and to coordinate and make necessary budgetary arrangements for those additional activities that may be required. Thus any special projects planned as additional contributions to the IQSY program are in large measure being sponsored by the NSF in close coordination with the National Academy of Sciences' Committee for IQSY.

Air Force Participation

The U.S. Air Force program for IQSY is a most ambitious one and includes extensive observations and full participation. The Office of Aerospace Research (OAR) will sponsor important and con-

tinuing research in cosmic and solar radiation studies. These studies will be primarily concerned with delineating modulation and acceleration mechanisms. The Air Force Cambridge Research Laboratories of OAR will be the primary organization for USAF participation and will conduct programs in meteorology, aeronomy, geomagnetism, aurora, airglow, ionospheric physics, cosmic rays, and solar physics. This participation covers the entire spectrum of the IQSY scientific endeavor.

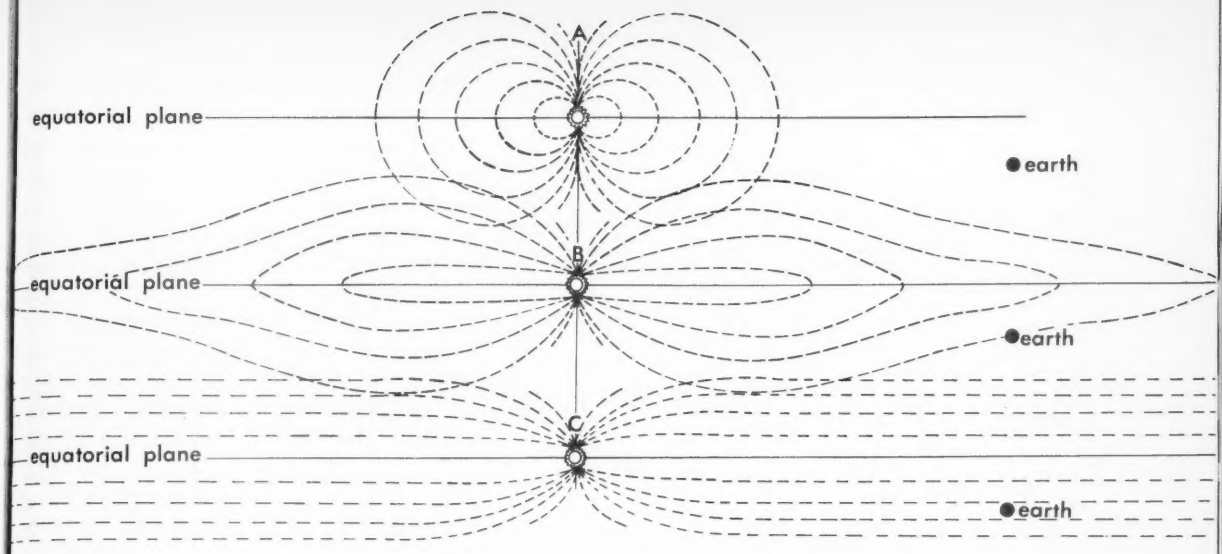
ozone

An experimental program for the measurement of atmospheric ozone is planned. This program includes a network of eleven stations established in cooperation with the Air Weather Service, Department of Transport of Canada, and several universities in the United States. The plan calls for a continuation of the existing ozonesonde network into the period of the IQSY. The program is designed to provide high-resolution measurements of the vertical and horizontal ozone distribution required for research into the dynamics and energetics of the upper atmosphere. In view of the intimate relationship between ozone and the energy budget and the circulation regimes of the upper atmosphere, the measurement of ozone in three-dimensional space should be considered an important aspect of the IQSY meteorological program. Of particular interest is the response of the upper atmosphere to variations of solar ultraviolet and corpuscular radiation. The proposed schedule for ozonesonde ascents at each network station conforms with the IQSY Committee recommendations. Soundings will be made at each station at 1200 hours Greenwich time each Wednesday, plus additional flights on Monday and Friday during weeks designated as Geophysical Intervals. In addition, a small number of ozonesondes (remainder of an annual total of 1000) will be available for use in situations of special geophysical importance.

wind

A technique utilizing the observation of meteor trails by a network of ground stations to obtain wind data in the 80–120-km height range is

Inexpensive Arcas rockets send small instrument packages as high as 30 miles to sample the upper atmosphere. The samples tell scientists something of the chemical processes of the upper atmosphere resulting from the sun's action.



Effect of solar wind on the sun's magnetic field. (A) No solar wind. (B) Solar wind moderate. (C) Solar wind strong.

being developed for use during IQSY. Observations will be made by Doppler radar, and no flight vehicles are required.

radiation

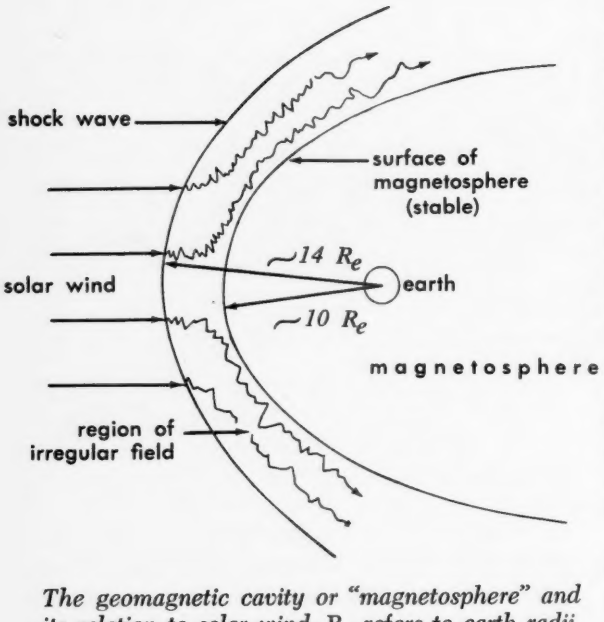
USAF is conducting a well-established, continuing program of research on the aerospace radiation environment. The purpose of this project is to investigate the solar extreme ultraviolet (EUV) and X-ray photon flux in the aerospace environment and to study the low-energy charged particles that often are produced by absorption of this radiation. By means of rocket- and satellite-borne instrumentation, data are acquired on several aerospace parameters:

- quantitative measurements of solar EUV and soft X-ray radiation between 1 and 1300 angstroms
- the spectral photon flux in this wavelength range in the interplanetary space and immediately above the earth's atmosphere
- the attenuation of solar radiation between 1 and 1300 angstroms within the earth's atmosphere
- the associated rates of ion formation in these environments
- the magnitude of photoelectron emission current from solid surfaces exposed to solar radiation between 1 and 1300 angstroms
- experimental analysis of the charged particle environment, part of which may result from absorption of solar radiation.

Inasmuch as all these measurements involve observations of the radiation from the sun, the results of this experimental program are directly applicable to several areas of investigation that are of prime interest before and during IQSY.

magnetic field

It appears that most if not all of the universe is pervaded by magnetic fields. The configuration of these fields is of interest for the information that they give about the electric currents which produce them and because of their effects on charged particles in space. They may provide acceleration or deceleration, guidance and deflection, and intensity modulation of the particles. The earth's main magnetic field is commonly supposed to originate by dynamo action in the fluid motion of the molten metallic core of the earth. The intensity of the earth's field is approximately one-half oersted—a weak field by most standards. Yet the geomagnetic field occupies a very large volume, and, since the energy of a magnetic field is proportional to



The geomagnetic cavity or "magnetosphere" and its relation to solar wind. R_e *refers to earth radii.*

the volume, the field is a most important factor in the terrestrial environment. It screens the earth's equatorial regions from cosmic rays with energies of a few tens of billions of electron volts and traps charged particles in the Van Allen radiation belts.

Research on the geomagnetic field since 1940 has been directed mainly toward an understanding of the transient variations. The greatest progress in this direction has come about through applications of the principles of hydromagnetism. The transient variations arise from changing electric currents flowing in the ionosphere or the magnetosphere or from hydromagnetic waves generated by interactions between the geomagnetic field and ionized gas (plasma) moving out from the sun. This gas, which is thought to flow radially outward, is referred to as the solar wind (Figure 2). This solar wind will push into the geomagnetic field roughly to the point where the kinetic-energy density of the solar wind is equal to the magnetic-field-energy density and will form an elongated cavity in the solar wind (Figure 3). The geomagnetic field is contained inside this cavity, which is often called the "magnetosphere."

USAF plans to conduct solar wind experiments by firing one rocket towards the sun, one at right angles to the plane of the ecliptic or earth–sun line, and one into the geomagnetic tail. These experiments will be an attempt to differentiate between the open (comet-tail) or closed (teardrop) configuration of the geomagnetic field. This determination is of great significance, since the configuration of the tail of the geomagnetic field bears directly on any improved understanding of auroral phenomena as well as being the pertinent geophysical

The aurora is an indirect manifestation of solar radiation, but auroral mechanism is only partly understood.

factor that will determine whether radiation (such as from a nuclear explosion) in the polar region will remain trapped in the geomagnetic field or will escape to interplanetary space.

Sounding rockets will also be fired from Fort Churchill, Canada, and from an equatorial launch site, to investigate the auroral and equatorial electrojets.

Experiments are planned to detect naturally occurring hydromagnetic waves, to determine their spectrum and amplitude, to obtain absolute values of total magnetic field as a function of position, and to detect overhead current systems in mid and equatorial latitudes.

The standard magnetic observatory at Weston, Massachusetts, a part of the Air Force Magnetic Test Facility, will continue normal operation throughout 1964 and 1965.

A program of short-period geomagnetic fluctuation measurements is concerned with the magnetic fluctuations in the frequency range 0.005 to 50 cycles per second. Measurements during the IQSY are expected to yield more information on the nature and origin of these fluctuations and, thereby, on the hydromagnetic properties of the ionosphere and magnetosphere.

aurora

The auroral studies program at the Air Force Geopole Station at Thule, Greenland, will continue with the operation of the Auroral Patrol Spectrograph, All-Sky Camera, visual, photometer, and riometer (relative ionospheric opacity meter) observations. It is planned to add a magnetometer and a high-dispersion spectrograph. An observational program for conjugate studies in the Northern and Southern Hemispheres is under way. Rocket-borne auroral spectral investigations will continue with two Astrobee flights in the first quarters of 1964 and 1965. It is intended to extend measurements down in the ultraviolet spectrum to the limit of the instrument's capability. Plans also call for detectors for measuring energetic electrons to be flown with the spectrometers on rocket vehicles.

Airglow may be defined as the luminescence of the earth's atmosphere. While some radiation is emitted from relatively low levels of the atmosphere, the interest here is in emissions from heights greater than 70 km. The objective is to determine the spectral composition, temporal and spatial variations, and an explanation of the mechanism for the excitation of the airglow emissions. Correlations of the airglow emissions with other geophysical parameters will also be investigated. The primary emphasis in past work has been on the systematic survey of selected airglow emissions from ground stations at different locations. It is anticipated that this work will be continued through IQSY with an increase in the number of stations through cooperative arrangements with scientists in other areas. Attempts will also be made to broaden the spectral coverage. Rocket measurements will also be necessary for such purposes as the measurement of ultraviolet emissions and direct determination of the emission heights.

radio astronomy

The USAF radio astronomy program encompasses studies of planetary radiation of several types, such as blackbody, synchrotron, and burst, to determine the electromagnetic reflection and emission properties of planetary atmospheres; investigations of the modulation processes of the solar bursts; and research on hydrogen-line spectrum transmission involving radiation processes from extragalactic sources. For this work scientists utilize an 84-foot radio telescope and log periodic antennas. A 150-foot steerable parabolic antenna is nearing the operational state. Particular efforts will include auroral studies in support of scintillation observations by radio star and satellite techniques, satellite observations of total electron content and scintillations, solar measurements—3-cm solar flux measured daily, and cosmic noise absorption studies.

ionospheric studies

Ionospheric beacon satellites are used to make measurements of electron densities in the ionosphere as well as in detail to study the nature of ionospheric irregularities causing scintillation. The NASA beacon satellite S-66 continuously transmits a valuable signal source for these ionospheric studies during the IQSY. These measurements will provide information concerning the distribution of electrons in and above the region of maximum electron density during a period of low solar activity

The action of the sun on chemicals sent aloft by rockets is a means for measuring solar energies. Here chemicals are released at 60 miles altitude, part of AFCRL's Firefly chemical release program.

Four rockets of the Black Brant or Astrobee 200 type will be fired each year at Fort Churchill. Each rocket will contain several probe experiments for the measurement of related ionospheric parameters. The experiments include the conductivity probe, impedance probe, plasma frequency probe, retarding potential probe, absorption experiment, pulse propagation experiment, Langmuir-type probe, and electrostatic analyzers. The rockets will be fired into auroras and auroral absorption events.

Radio propagation through the ionosphere and exosphere depends principally on the electron density of these regions and on the collisional frequencies of electrons with the heavier particles. These solar-dependent parameters affect the attenuation, refraction, and reflection properties of the medium with respect to radio waves.

USAF has established a worldwide network of 19 riometer sites for monitoring cosmic noise and ionospheric absorption of galactic radiation. An ultrasensitive, transistorized riometer designed by USAF scientists is located at each of these receiving sites. A riometer measures the amount of radio energy from space penetrating the ionosphere. As the ionosphere increases in density, less radio energy from space can penetrate it. Ionospheric density is increased by solar disturbances, normal solar radiation, and nuclear explosions in or near the ionosphere.

Because of the last of these influences—that is, nuclear explosions—riometers are used to study the effect of nuclear explosions on communications and on the diffusion of charged particles from atomic explosions in the ionosphere. Cosmic noise is absorbed to some extent by the Van Allen radiation belts as well as by the ionosphere. The level of radiation in the lower belt was greatly increased by the nuclear shot of 9 July 1962, and the decay rate of this increase is of great concern to scientists. Data from the USAF riometer net provide a rough indication of the rate at which this enhanced radiation will decay. It is anticipated that this riometer network will have a very prominent role in monitoring solar disturbances during the IQSY.

Two satellites containing an impedance probe, a retarding potential probe, and an electrostatic analyzer will be flown during the IQSY. These will have a near-polar orbit with approximately a 200-km perigee, a 3000-km apogee, and a three-month lifetime.

From these synoptic observations it will be possible to determine the influence of the earth's magnetic field on bombarding solar particles, the flux and energy of particles causing absorption, the ionizing processes in lower atmosphere, and the nature of interplanetary propagation. Correlation with National Bureau of Standards north-south pole data may permit separation of corpuscular and electromagnetic phenomena, which so far has proved difficult by polar measurements alone.

In a very ambitious plan USAF proposes a cooperative experimental field program during the IQSY for the comprehensive simultaneous measurement by vertical probe rockets of a group of interrelated chemical and physical properties of the D and E regions of the ionosphere. Measurements of these properties provide data on (1) mass motions, including winds, wind shears, and turbulence, (2) winds and oxygen atom concentration, (3) acoustic velocities and ambient temperatures, (4) density, pressure, and temperature of neutral particles, and

(5) electron and positive ion concentrations and temperatures. To date the diurnal and latitude variation of these properties with altitude and their interrelations with each other have been highly speculative. Tests of present theories concerning relative effects of tidal motions, solar radiation in different wavelength regions, and high-energy particle flux in determining the meteorology and chemical physics of the region from 70 to 160 km urgently require such a series of measurements on a systematic basis. Until recently, measurements of the type outlined were not well developed and in fact were more often tests of techniques than measurements of the ambient atmosphere. However, recent experiments during the Johnston Island nuclear tests and during the Firefly III chemical release program have demonstrated that reproducible and interpretable techniques are now available.

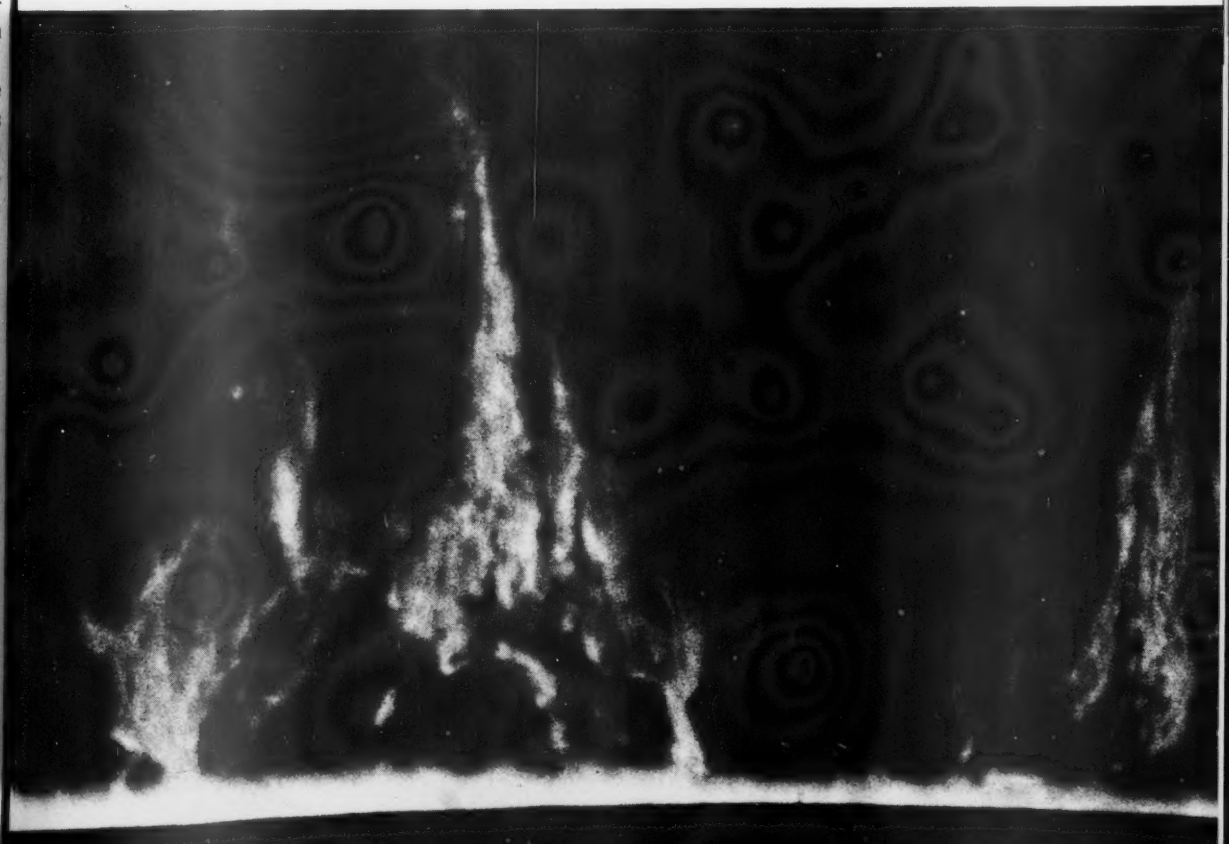
solar cosmic rays

The discovery of high-energy charged particles that originated at the sun and impinged upon the earth was made by Forbush and Lang in 1942. These particle streams have come to be designated as solar cosmic rays. We are still far from a complete understanding of their origin, composition, propagation, and terrestrial and extraterrestrial effects.

Distinction between the solar cosmic rays and the solar wind should probably be based upon their mode of production or acceleration in the chromosphere, but this is not yet possible. The differentiation is made arbitrarily on the basis of energy, it being assumed that the solar wind comprises protons (and presumably other ions) in the energy range of hundreds or thousands of electron volts, while solar cosmic-ray energies range from perhaps 100,000 electron volts to a few billion electron volts. Further research, such as that planned for IQSY, will no doubt show whether there is in fact a distinction or continuous gradation between them.

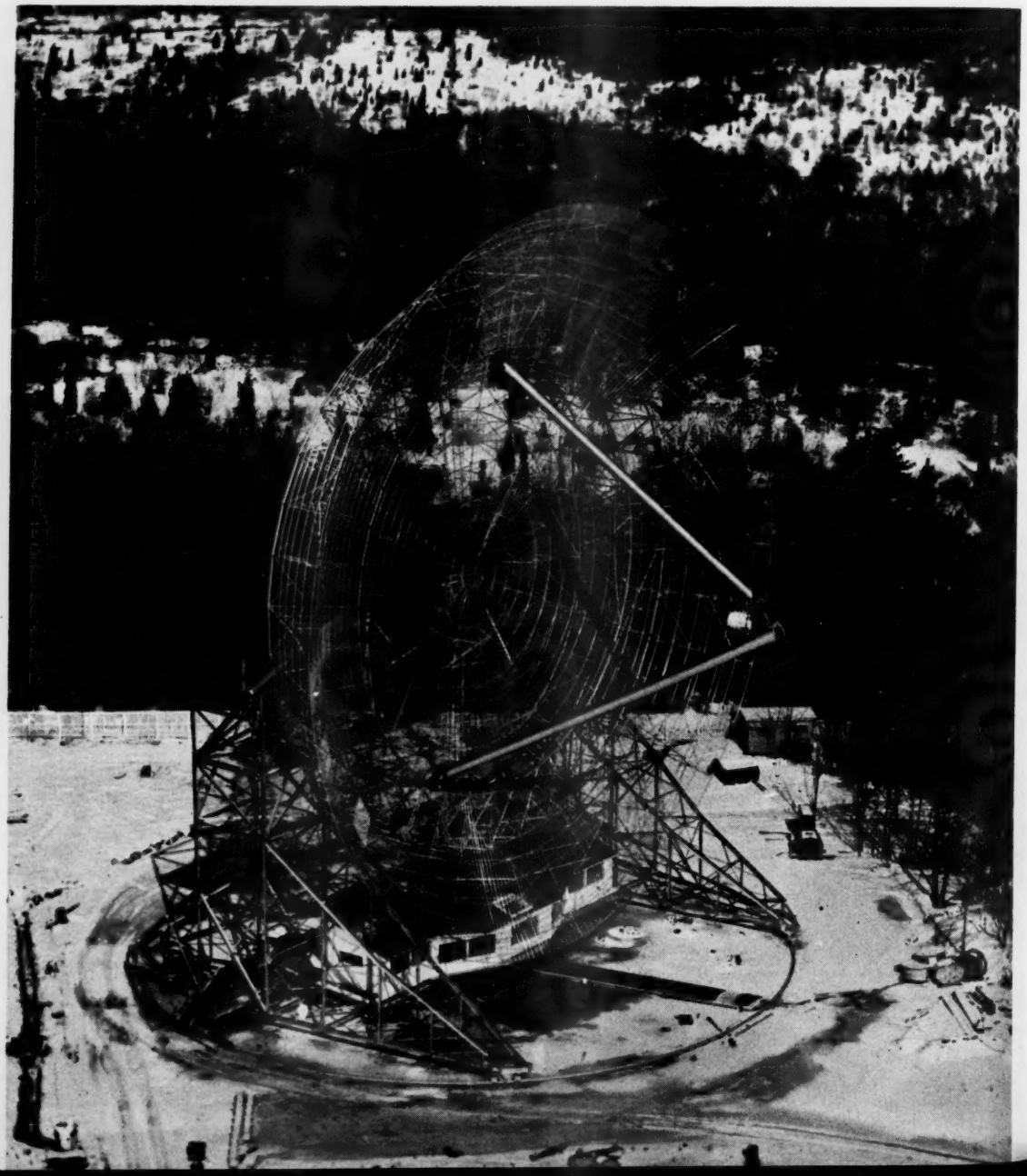
When a high-energy particle collides with the nucleus of an air atom, a number of secondary par-

Solar flares such as this "hedgerow prominence" erupt violently from the surface of the sun even during quiet periods. Often they attain an altitude of 100,000 miles or more.



ticles are created in varying number and with varying energies. These particles, in turn, collide with other nuclei, giving rise to many more particles—but with a loss of energy after each collision. Through this process the energy is usually dissipated in the atmosphere before it reaches the earth's surface. Only when a particle enters the atmosphere with extremely high energy does this chainlike collision process persist through a sufficient number of generations to create a radiation dose on the earth's surface. In rare instances a single high-energy particle can result in a large radiation shower extending over several square miles of the earth's surface.

The 150-foot radio telescope at Hamilton, Massachusetts, began operation this year. The absorption of signals from space by the ionosphere tells something of variable energies emitted by the sun.



In the main observatory at AFCRL's Sacramento Peak Observatory, five telescopes are mounted on a single spar. Sacramento Peak is one of three major solar observatories in the country.

The absorption, scattering, and distribution of cosmic radiation in the earth's atmosphere will be studied extensively during the IQSY by use of balloons, rockets, and Air Force satellites. The satellite measurements program calls for:

(a) Individual hitchhike type experiments on low-orbiting (below the Van Allen belts) polar satellites.

The experiments are designed to specifically measure such parameters as would be masked due to the high intensity of other radiation if flown on higher-orbiting vehicles. The experiments include the composition of the primary cosmic radiation and the albedo neutron flux.

(b) Satellites designed to specifically measure trapped radiation and polar influxes of radiation.

The satellites are solar-powered and have an elliptic, almost-polar orbit with perigee at about 120 nm and apogee at about 2500 nm. They will contain instruments for the measurement of protons and electrons from zero energy into the 100-mev range.

It is intended to carry out continuous measurements throughout the IQSY specifically to study the behavior of the lower portion of the Van Allen trapping region and to determine the relatively low altitudes to which there are polar plasma influxes at times of solar minimum.

solar flares

At times of unusual solar activity the sun's atmosphere is analogous to that of the earth during bad weather, i.e., it churns and boils and produces disturbances. For these reasons some solar physicists refer to this activity as "solar weather." At times, these storms on the sun produce the great eruptions known as flares. These flares spray

charged particles, X-rays, and other kinds of radiation through the solar system. This form of solar activity produces the familiar terrestrial effects of geomagnetic storms, radio communications blackouts, and brilliant auroral displays, and it partially empties and refills the Van Allen belts of charged particles trapped in the geomagnetic field, a phenomenon not yet entirely understood. A medium-sized flare may release an energy equivalent to millions of H-bombs, yet the mechanism of this process is not well understood either.

AFCRL's Sacramento Peak Solar Observatory at Sunspot, New Mexico, is generally regarded as the main solar patrol station in the Western world. While the observatory's major efforts for a number of years were centered on those basic processes of the sun which affect atmospheric radio propagation conditions, a new requirement has arisen as a result of the launching and operation of satellites and man's excursions into space. Sudden outbursts of electromagnetic and corpuscular radiation associated with solar flares result in radiation that would be lethal to astronauts and damaging to satellites. Accurate predictions of "safe" periods are required. The high-energy shower particles are mainly fast protons from the sun, with energies ranging from less than 10 mev to about 50 kev. The normal duration of a shower is three or four days. Each shower observed followed within 30 to 300 minutes the onset of a large solar flare of class 3 or 3+. Proton showers are regarded as part of the flare phenomenon. It is probable that the only distinguishing feature of a proton flare is that its proton beam is aimed at the earth. There is at present no means of anticipating whether or not a large flare will be a proton flare. A "safe" period, then, is one during which the probability of the occurrence of any major flare is small. Since starting the prediction program, Sac Peak Observatory personnel have been able to predict correctly all proton showers, although initially many false alarms were given. Early in the program about 80 per cent of the time was designated unsafe. Unsafe periods have since been reduced to about 30 per cent. The observatory has predicted safe periods for the first two American manned orbital flights.

USAF's research program at Sacramento Peak Observatory will take full advantage of the opportunities to observe that will be provided during IQSY. The program will include a solar flare patrol wherein the disk of the sun will be photographed on 35-mm film once every two minutes during all clear daylight hours in the hydrogen alpha-line and K-line spectral emissions. The resulting films will be searched each day for flares and all other abnormal solar features. The spectrum of the corona will be taken at all position angles, and intensities of lines of interest will be measured. Simultaneous coronal and prominence cinematography, using a 6-inch coronagraph and birefringent filter, will be carried out with 88-second exposures made every 90 seconds. Daily magnetic charts of the solar disk will be constructed, with especially detailed treatment for active centers. Nothing will be overlooked that may add to our basic knowledge of solar physics and enhance the highly important solar-flare/proton-shower prediction techniques. The IQSY observations will be of unique interest because the events are likely to be isolated and not confused by interplanetary and atmospheric disorder from preceding or precursors of subsequent events.

THERE IS NO DOUBT that the International Year of the Quiet Sun will offer unique observational opportunities for all the disciplines that deal with the end product of a solar disturbance—production of solar particles and ejection of plasma, modulation of galactic cosmic rays, and the final degradation in the terrestrial atmosphere of the energy released on the sun, manifested as auroras, blackouts, electric currents, hydromagnetic effects, atmospheric heating, and winds. It is impossible to make a true assessment of long-range benefits to be derived from participation in such a program. They should, however, be comparable to those from the IGY. The IGY, representing scientific and technical contributions by 66 nations (and in which the United States played a leading role), saw the beginning of our scientific program and led directly to the Antarctic Treaty providing for the continued cooperative scientific program by the U.S. and 11 other nations, including the Soviet Union.

The United States Air Force is uniquely qualified with competent in-house capability to cover the entire spectrum of IQSY disciplines. As a major contributor to the IQSY, the Air Force expects to see results that will greatly advance our understanding of what, to man, is the most important object in the entire universe—the sun.

Air Force Cambridge Research Laboratories

STEEP - THE SYSTEM TEST AND EVALUATION EXPEDITING PROCEDURE

COLONEL JAMES H. WALKER
LIEUTENANT COLONEL EDMUND A. WRIGHT, JR.
AND DR. WAINO W. SUOJANEN

A BROAD industry base working intimately with the military is a prime requisite in concurrency applications designed to telescope the lead time between the initiation of research and development on a system and its availability for operational use. Close coordination between the military and the industrial team becomes absolutely essential, but the sharper the reduction in lead time, the greater are the problems.

In support of the concurrency concept at the test and evaluation phase, the following principles have proved valuable.

a. *Avoid dead-end testing.* No major subsystem or component is tested except in the configuration in which it will appear in an operational version of the missile.

b. *Ground-test whenever possible.* Not only is flight-testing more expensive but ground-testing frequently provides better data.

c. *Test early and frequently.* This principle reduces the number of the more expensive flight tests to a minimum.

d. *Demonstrate that the system will work in its intended military environment.* From the viewpoint of the user, this is the most important aspect of the concurrency concept. No matter how much the development-production-training cycle has been telescoped, if the system does not perform within operational requirements it is useless. It is in this phase of test and evaluation that STEEP has proved itself as a management technique in the Joint Bomarc Test Organization (JBTO) at Eglin Air Force Base, Florida.

genesis of STEEP

The Air Force now divides system testing and evaluation into three categories. Category I test programs are conducted by the contractor, Category II testing is performed by the Air Force Sys-

tems Command (AFSC), and Category III test programs are conducted by the using command. Needless to say, there is considerable overlap among the three categories.

The test program of the Bomarc A weapon system was not conducted under STEEP. What is now designated as Category I testing of the Bomarc A was completed at the Atlantic Missile Range in November 1958. This phase of test and evaluation covered only the missile itself because of the emphasis at the time on demonstrating the feasibility of the basic unmanned-interceptor concept.

The Category II phase of the test and evaluation program for the Bomarc A, which was performed at the Eglin Gulf Test Range, started with considerable nontactical equipment and curtailed contractor support. Eventually, several successful firings were made, but only after the contractor had been called in to provide emergency support during the latter phases of Category II testing.

Many of the procedures used during Category II were nontactical in nature, and the tests were successful because highly qualified technical people, employed by the contractor, were present to improvise on the spot. This system was not operational to the point where the using command could begin Category III testing. As a result the project officer in charge requested the contractor to demonstrate that the system could indeed operate in its intended tactical environment under actual operating conditions before the Air Force Systems Command would release it to the customer, in this case the Air Defense Command.

This test and evaluation philosophy is a necessary aspect of the concurrency approach to system development. However, it is quite clear that there is a basic conflict between the first three principles, which apply mainly to Category I testing and evaluation, and the fourth principle, which requires the contractor to demonstrate that the system will indeed operate as an integrated system in its intended tactical environment. This is particularly true of the "test early and frequently" principle. Under this concept items in the most advanced stage of development undergo the most testing. Conversely items in less advanced stages of development are tested least frequently, and items that have not yet been developed obviously are not tested at all. Successful Category I tests do not guarantee that Category II and III tests will be equally satisfactory. The entire system must be tested as a total and integrated whole before Category II and III testing can be considered successful. The problems of Category II and III testing and evaluation are complicated by the Air Force regulation requiring that Category I testing and evaluation include only components and subsystems rather than the entire integrated system.

test and evaluation philosophy

As a result of the experience with Bomarc A, the Air Force learned that the acceptance of equipment from the contractor for Category II testing had been premature. Specifically, the experience of the year-and-a-half test period indicated that the Air Force had released the contractor from his development responsibilities without obtaining evidence that the system, as a whole, would work in its planned tactical environment.

As the Category II test program continued, it became increasingly apparent that only the development contractor possessed the capability of engineering the required changes or fixes to a complex system. It also became clear that fixes accomplished on an ad hoc basis to individual items of equipment were frequently incompatible with system operation and at times jeopardized the maintenance of configuration control. Difficulties were also encountered in incorporating changes in equipment already accepted by the Air Force because only the slow, cumbersome change procedures required by regulations could be used when introducing the modifications.

It was finally concluded that the Air Force would be unable to achieve reliable system operation on a time schedule consistent with program operational needs. The contractor was then required to demonstrate the equipment in the identical environment in which the Air Force tests had been performed. From this challenge, the approach presented in the following text was developed, first as the "Contractor Review Program" (CRP) on the Bomarc A and later as the "Contractor Functional Demonstration" (CFD) on the Bomarc B (IM-99B). In contrast with the difficulties encountered in the earlier Bomarc A program, the IM-99B Contractor Functional Demonstration, along with certain other innovations, which are collectively referred to as STEEP, resulted in controlled and highly

effective efforts in testing and evaluation.

the demonstration contract

Three general assumptions were accepted: (1) that the development contractor has the best capability for engineering fixes to a complex weapon system, (2) that the need for such changes should be established as early in the program as possible, and (3) that contractor incorporation of modifications to the system is much faster on undelivered equipment than on delivered equipment. Accordingly it was concluded that the Air Force should defer accepting hardware from the contractor until it has been clearly established that individual items and subsystems are usable in their intended Air Force environment as functional parts of an integrated weapon system. This requirement is underlined by contractually requiring the contractor to demonstrate the system in accordance with criteria established by the Air Force. Air Force engineering and operations personnel are responsible for determining that system performance as demonstrated meets these criteria.

Final specification configuration and performance of the system are not required *at the start* of Category II tests. Rather the desired goal at this point is the demonstration of a workable system by the contractor. The ultimate purpose of this Category II demonstration is to determine that a tactically configured system, maintained and operated by Air Force personnel using available documentation, can in fact operate in its intended operational environment.

Within the scope of these objectives, it was decided that the Air Force should accept only tactically operable hardware. To fulfill this requirement, equipment must be supported by required documentation (technical data). Equipment may be accepted short of specification requirements if in a workable configuration. In these instances an appropriate notation of noncompliance with specifications is made. This policy assures the Air Force that a workable system will be available for follow-on special tests and for tactical deployment within the shortest possible time.

demonstration criteria and evaluation methods

Once a demonstration contract is established, the test organization is in a position to schedule the Category II test program around the contractually required demonstration. As has been indicated, the contractor must demonstrate to criteria established by the Air Force. These criteria are prepared in detail and made binding on the contractor either as part of the contract or by reference in a contractual document. The demonstration requirements, in essence, define the game and the playing field, whereas the criteria provide the rules of the game and are absolutely necessary to avoid later disagreements. Generally, the criteria documents cover purpose, scope, ground rules, applicable publications, and detailed requirements.

After the required demonstrations and the criteria for conduct and acceptance of demonstrations are established, the methods for evaluating individual equipment and system performance against the required demonstrations are documented. The complete weapon system is divided into groups of equipment that perform generally independent functions as part of the over-all system, such as the missile launcher, calibration equipment, handling equipment, and the automatic missile checkout equipment. The Air Force engineers charged with the responsibility for evaluation document the test methods to be used for each of these functional groups.

The "Evaluation Methods" documents specifically establish:

- equipment being evaluated
- equipment configuration
- supporting technical data
- test requirements, including
  - personnel
  - equipment calibration
  - supporting equipment
  - operation
  - maintenance
- tests or demonstrations to be performed
- data collection
- data analysis methods
- required acceptable performance.

These documents, prepared in advance of testing, provide an understanding between the Air Force and the contractor of what is to be accomplished and how the Air Force plans to evaluate the results of the contractually required demonstrations. They establish the rules of the game to be followed by

the Air Force and by the contractor to determine whether the contractor development effort has produced a workable system. The Evaluation Methods documents also provide the data needed to schedule and measure test progress. The specific demonstrations which they require must be consistent with those appearing in the contract. Required performance, in turn, should be consistent with existing system documentation, such as model specifications. These documents normally include the proviso that the method of evaluation is to be determined by Air Force test engineers.

test procedures and controls

Test operations, using normal tactical procedures to the maximum degree possible, are conducted within the constraints laid down by the evaluation engineers in the Evaluation Methods documents. Before the demonstration tests begin, highly qualified engineers are assigned to each individual functional group of equipment. These evaluation engineers decide whether the demonstrations have been conducted in accordance with the test criteria and determine whether the measured equipment performance is acceptable. The results of their observations are included in an engineering evaluation report, which becomes the ultimate basis for Air Force acceptance or rejection of system hardware.

During the test demonstrations, deviations are documented as they occur, in the form of deficiency reports. The "Deficiency Report" provides official notice to the contractor that equipment is unsatisfactory for Air Force acceptance and use, describes the nature of the deficiency, and suggests the required fix. Each Deficiency Report is treated as an action letter by project offices, contractors, the Air Force Logistics Command, and other agencies responsible for corrective action. Before equipment is accepted, the corrective action must be accomplished and the equipment redemonstrated. When long lead time prevents immediate redemonstration, "interim acceptable procedures" or "modifications" are utilized as criteria against which hardware is demonstrated.

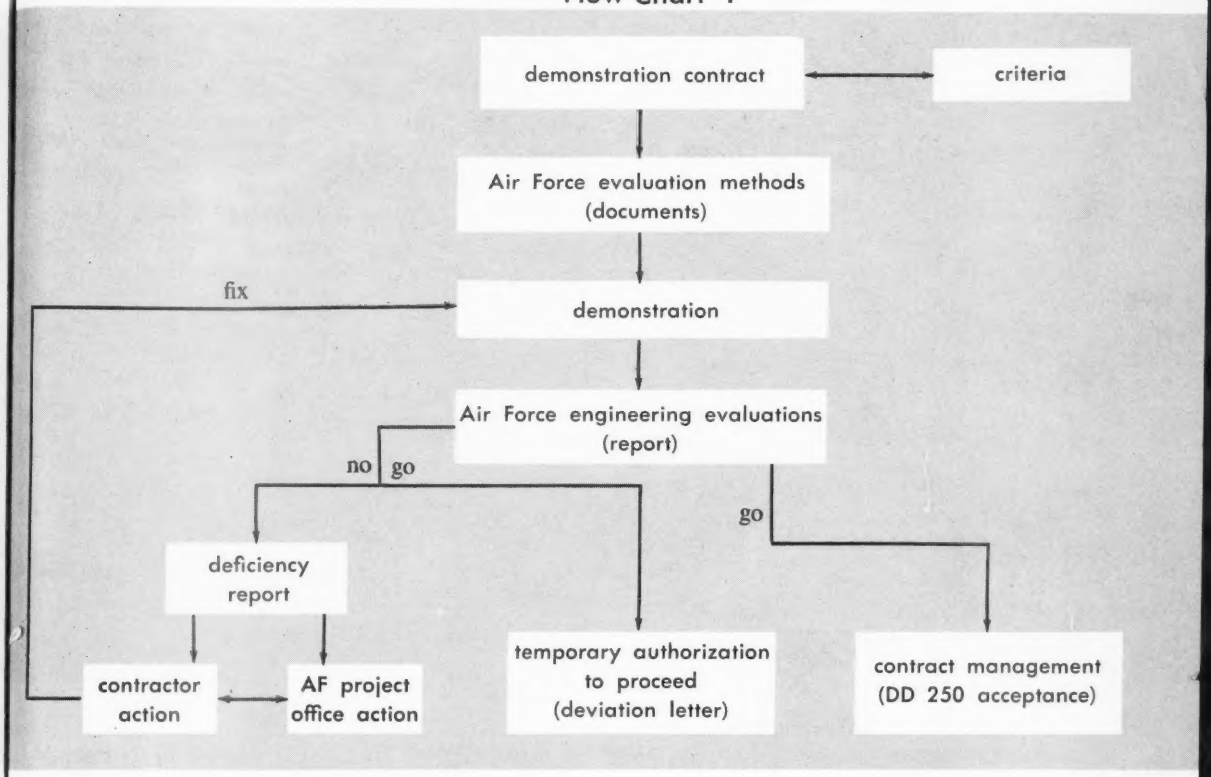
A tactically operable system is the desired end product. Since such a system is not expected at the start of tests, strict adherence to demonstration criteria may be waived by documenting deviations from prescribed procedures or equipment performance. Before the contractor is credited with an acceptable demonstration for contract compliance, however, all deviations must be corrected or other arrangements made to ensure acceptance of the equipment. The deviation procedure permits continuation of the test program in spite of system deficiencies, but the complete demonstration test requires a workable system. If the final, workable system is not completely in accord with specifications, noncompliance items are noted on Air Force acceptance documents (DD 250) for subsequent correction.

Flow Chart 1 outlines the major tools in a contractor functional demonstration—the demonstration contract, evaluation methods documents, engineering evaluation reports, deficiency reports, and deviation letters. If test and evaluation are to make a maximum contribution to telescoping the required lead time, the resulting data must be utilized by appropriate decision-making and controlling agencies. Too frequently the activities of test organizations terminate with the preparation of a report. Under the CFD concept of test and evaluation, contractor and Air Force agencies take immediate action against system deficiencies by feeding fixes rapidly back into the test environment with the objective of developing a tactically operational system in the shortest possible time.

Since the equipment used in conducting the Contractor Functional Demonstration has not been officially accepted by the Air Force, many fixes can be accomplished by on-site contractor engineering and shop facilities. Corrections, which require compliance with specifications, are processed as production revisions by the contractor within his own organization. This reduces the Air Force review and record-keeping functions to a minimum and accelerates the correction procedure. When equipment meets specifications but still fails to perform satisfactorily, engineering change proposal procedures are required. These changes can be accomplished on an expedited basis because the contractor still retains accountability for the equipment. This simplifies Air Force property accounting and configuration control. These procedures are indicated by Flow Chart 2.

The technical data required to support equipment maintenance and operation are evaluated as an integral part of each functional group of equip-

Contractor Functional Demonstration Flow Chart 1



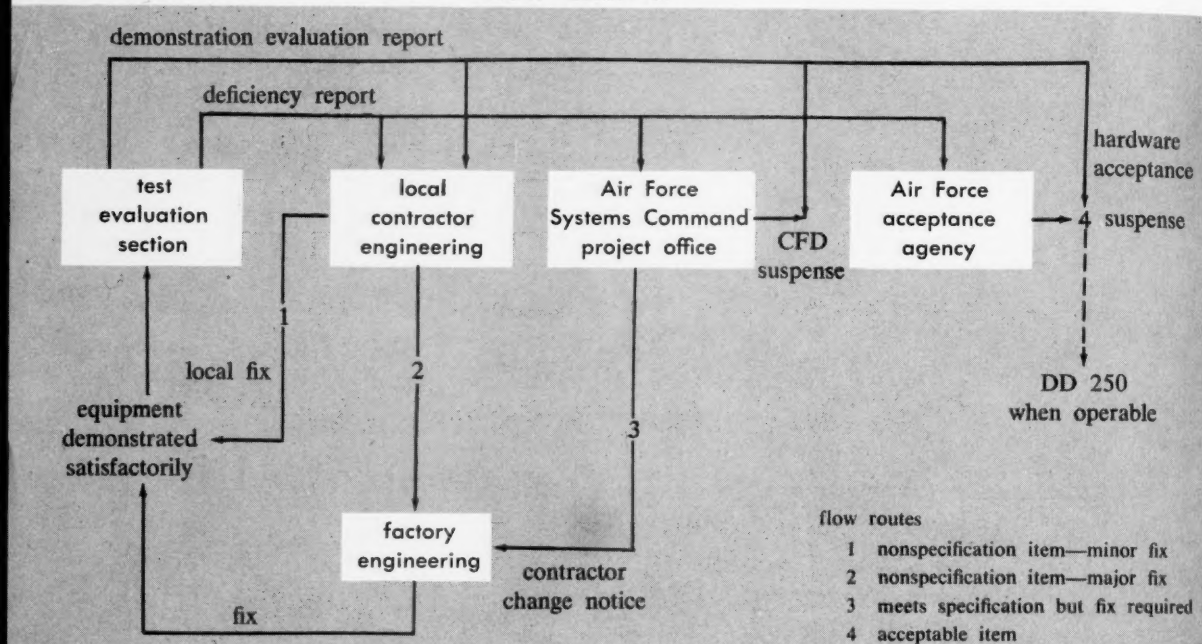
ment. The contractor is required to react to deficiencies in technical data in exactly the same way as to equipment deficiencies. Under STEEP, maximum progress occurs when authority to change technical data is delegated to the test organization. To do this, the contractor is required to provide technical writers at the test site. Technical data, as evaluated and corrected on the basis of test operations, are subsequently made available for publication by the test organization and are in print for use at the beginning of the Category III test and evaluation program.

In the area of supply support, the Contractor Functional Demonstration provides for the transition of the weapon system from contractor to Air Force use. Items provided by the contractor to support Category I tests are immediately available to support AFSC or the using command where the total stock has not been delivered or early provisioning has been inadequate. Parts consumption data are available to the Air Force Logistics Command without delaying AFSC testing and evaluation. At the same time, final configuration data become available, enabling AFLC to put the system into production and to begin filling the logistics pipeline.

The success of STEEP depends principally on a Contractor Functional Demonstration that employs only tactically operational equipment. In order to meet this objective, the test and evaluation organization must have:

- joint military–contractor test and evaluation organization
- direct organizational relationship to the weapon system project office

Evaluation and Deficiency Reports
Flow Chart 2



sufficient numbers of qualified in-house engineering personnel

detailed system test and evaluation plan

contractor participation through Category III test phase

contractor on-site design engineering support

contractor on-site technical data support

contractor supply support.

STEEP and weapon system management

The objectives of the concurrency concept, according to the Department of Defense, are to procure the development, production, and delivery of a weapon system into inventory in the shortest possible time at the minimum attainable cost. In this concept, time is the most valuable resource, and coordination presents the greatest problem.

A weapon system is not normally scheduled for full production until testing and evaluation have indicated that it will operate in its intended tactical environment. STEEP provides a method by which the greatest amount of time is saved and the problems of coordination are minimized in achieving this goal. In common with many other management systems, STEEP depends for its success upon a high degree of substantive decentralization. Successful decentralization depends upon well-trained quality personnel, the support of the people in the organization, and effective communication and control. STEEP meets all these criteria. In addition experience at the Eglin Gulf Test Range suggests that the traditional functional form of military organization must be considerably modified in order to do the best possible job of weapon system management.

The test and evaluation engineers who participate in STEEP must possess considerable management ability in addition to being professionally qualified in their areas of specialization. Further schooling in the laboratories and factories of the

development contractor is equally essential. Sufficient numbers of these qualified test engineers must be available so that each functional group of equipment can be adequately evaluated. The number of electronic engineers, for example, will depend on the number and complexity of electronic subsystems. Engineers must be present sufficiently in advance of the start of testing to acquire a detailed knowledge of the equipment and to design detailed test and evaluation procedures.

The delegation of authority to test and evaluation engineers is very broad in scope. Working together with the design engineers of the development contractor, they are authorized to initiate fixes for the great majority of deviations, most of which are made on the spot. This, perhaps as much as any factor, is responsible for the support given to STEEP by test and evaluation personnel.

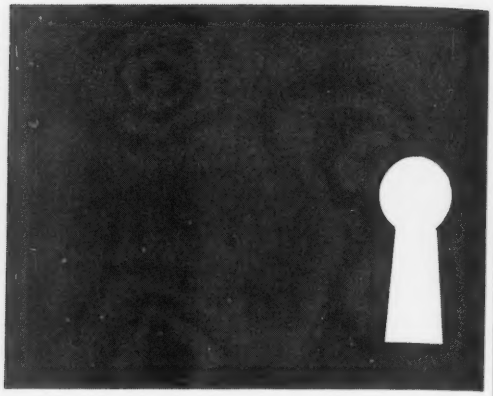
One other organizational feature is important in mobilizing the support of test personnel behind STEEP. All the test and evaluation people in the program work together as a team. This includes not only personnel from various commands of the Air Force but also the contractor personnel. Instead of paying mere lip service to the team concept, as is done in many organizations, STEEP provides the means by which the best possible weapon is provided at the lowest attainable cost in the shortest elapsed time by emphasizing the basic importance of human cooperation in the attainment of these objectives.

Finally, as indicated in Charts 1 and 2, STEEP is characterized by rapid and effective communication and control. Decisions are made at the lowest practical level of the organization because that is where the greatest and most directly applicable knowledge and most timely understanding come into play. Furthermore, real authority is delegated so that details need be neither reported after the fact nor checked out before the fact. The success of STEEP requires confidence on the part of top management that lower-ranking associates have the technical and administrative capacity to make sound decisions. Therefore authority to make decisions is delegated as closely as possible to those points where actions take place.

STEEP, developed by the Joint Bomarc Test Organization at Eglin Air Force Base, provides the framework within which the time devoted to test and evaluation is compressed and the problems of coordinating test and evaluation are minimized. In this respect STEEP should become as useful a tool in test and evaluation management as the program evaluation and review technique (PERT) has turned out to be in the administration of research and development. The combination of these two management techniques should prove very valuable to the Air Force in achieving the concurrency objective necessary for future military systems.

Eglin Air Force Base

In My Opinion



ORGANIZATION— THE KEY TO DOING A GOOD JOB!

COLONEL GEORGE H. HOLLINGSWORTH

IF ANY SINGLE element can be called the key to doing a good job, organization is that element. Having said this, I realize that I have an obligation to carry through with some unusually persuasive logic because most people simply will not believe that the common word *organization* merits such high priority or consideration in job accomplishment, whether it be civilian or military.

Here is my logic. First, forget about the usual definitions which the word undoubtedly brings to mind—a military unit with a cold, functional title, or a wall chart with lines and tragic little boxes filled with names, titles, and wordy functions, or administrative rules, policies, regulations, and instructions. Actually it is because of these typical reactions to the word that we frequently fail to recognize *organization* as a dynamic and changing term and to realize that it is an essential step we must take every time we set out to do something effectively and efficiently, whether it be the business of providing national security, building houses, or performing the daily household chores.

Consider for a moment that there are three basic steps we must take to accomplish *any* job in an effective and efficient manner. First, we must identify and define the *job* to be done. Next, we must develop a *plan* for doing the job. And finally, we must assemble or *organize* the resources and effort to do the job in accordance with the plan.

In applying these three steps—*job, plan, organize*—to the building contractor, we see that, first, he must line up his next *job,* whether it's laying in a driveway, building a house, or creating a housing development. Obviously this broad and fairly self-evident step must come first. Next, he must consider the *plan,* method, or design for doing the job. The blueprints and specifications are necessary for him to determine the exact resources in the way of materials, tools, people, and funds that he must procure and eventually use. Finally, he

must assemble or *organize* the people, tools, material, funds, and the effort for the most effective and efficient accomplishment of the job.

We, as Air Force managers, are committed to taking these same three steps in carrying out the Air Force operation, but perhaps a slight change of terminology will make them more familiar. Instead of *job, plan,* and *organize,* substitute *mission, strategy,* and *organization.*

Now, we all accept mission, strategy, and organization as concepts, but frequently we fail to reduce them to meaningful and positive steps to be taken in carrying out the Air Force operation. Or, even when they are accepted as necessary steps leading to job or mission accomplishment, there is a common tendency to rearrange their order so that organization usually winds up as the first step rather than the third.

An example of this. The newly assigned chief arrives, announces that there will be no major changes in operation or policy, waits a respectful three days, and then turns over the cart. The new organizational pattern strongly resembles that of the chief's previous station, although the missions are entirely different.

One of the officers of Merrill's Marauders of World War II fame in Burma, after experiencing the chaotic organizational tangle of the China-Burma-India Theater, was reported to have summed it up this way: "Perhaps because we are so good at organizing, we tend as a nation to meet any new situation by reorganizing; and what a wonderful method it can be for creating the illusion of progress while producing confusion, inefficiency and demoralization."

Then there is the familiar story of organization taking over from mission and strategy and even becoming the dominant factor, simply because time and tradition have set in and led to veneration for the existing organization. In the meantime the mission may change, and the strategy or plan will certainly vary with the availability of resources. Yet there is a tendency, because of past honors and traditions, to keep the old organization intact, only minor variations being made to match it to the new mission and strategy.

I seek to emphasize that if organization is to continue as a functional and effective third step in our business of providing national security, it must be flexible and kept in accord with the mission, which comes first, and the strategy, which is second.

As Air Force managers, we have the obligation—indeed it must be our principal management objective—to ensure that we are expending a minimum of resources in terms of people, things, and money and at the same time achieving maximum mission effectiveness. While this has always been an inherent responsibility of management, its necessity in the Air Force is certainly emphasized by the size, complexity, and cost of current and future aerospace weapon systems that are required to maintain the Nation's necessary offensive and defensive superiority in this space–nuclear age.

In actuality this third step, organization, is the key to aerospace power employment! Without the proper assembly and arrangement of our available resources and effort, we shall be no more effective than the contractor who calls in his roofing crew before the foundation is laid or the housewife who buys furniture and draperies for a house she hasn't seen. We can have the simplest and clearest mission to accomplish, with the most resourceful plan, and yet if we *mis*organize our resources or organize without realistic regard for the mission and the strategy we shall fail in our management purpose, which is to achieve maximum mission effectiveness with a minimum expenditure of resources. And worse, if we do *mis*organize, there is veritable assurance that we shall fail in our vital mission accomplishment. If we allow this to happen, there is no profit to be realized from our huge national investment in aerospace power.

Headquarters AFROTC

Books and Ideas

THE RED ARMY AND HOW IT GREW

DR. KENNETH R. WHITING

THE LAST DECADE witnessed a veritable flood of books and articles on almost every facet of the Soviet Union, past and present. But very few of them were concerned with the development of the Red Army in the period before World War II. D. Fedotoff White's *The Growth of the Red Army*, published in 1944, remained the unchallenged classic in the field. At long last, however, another work worthy of the appellation "scholarly" has been added to this esoteric coterie, John Erickson's *The Soviet High Command.*† Incidentally, the title of Mr. Erickson's book is somewhat misleading, as he covers just about every aspect of the development of the Red Army, from its weapons to its political commissars.

Some idea of the difference between Western scholarship and Soviet history à la propaganda can be gained by contrasting Mr. Erickson's work with the official Soviet version (at least for the time being) of some of the same story as related in the first volume of the six-volume history of the Great Fatherland War.* There is also a brief account of the development of the Red Army in Sokolovsky's *Military Strategy.*** The two works are certainly a vast improvement over the custom-built history of the Stalinist period. Invidious as the contrast with Erickson's book is, the two Soviet accounts, unlike most of their predecessors, are at least history, and as Dr. Johnson commented in regard to a woman's preaching, "It is not done well; but you are surprised to find it done at all."

**Istoriya Velikoy Otechestvennoy Voyny Sovetskogo Soyuza 1941-1945* (History of the Great Fatherland War 1941-1945) (Moscow: Voennoe Izdatel'stvo Ministerstva Oborony Soyuza SSR, 1960). The author of this article has received only the first four volumes of the projected six volumes. The historical mills grind slowly in the Soviet Union. Volume I is devoted to the development of events leading to the Nazi attack on the Soviet Union in June 1941. Although sketchy on early events in the growth of the Red Army, the coverage of the middle and late 1930's is quite complete.

**V. D. Sokolovsky (editor), *Voennaya Strategiya* (Military Strategy) (Moscow: Voennoe Izdatel'stvo Ministerstva Oborony Soyuza SSR, 1962). There are at least three English translations of this work now available.

†John Erickson, *The Soviet High Command: A Military-Political History 1918-1941* (New York: St. Martin's Press, 1962).

The Red Army was born in the spring of 1918, and for some mysterious reason it celebrates a minor skirmish with the Germans on 23 February 1918 as its birthday. It came of age in the weird combination of savagery and selfless heroism of the Civil War (1918–1921), sank to its nadir during the New Economic Policy (1921–1928), was provided with an industrial base during the first two Five-Year Plans (1928–1937), was deprived of the best of its officers during the Great Purge of 1936–1938, and, although suffering hideous losses in the initial stages, emerged victorious in World War II.

This is the story that Mr. Erickson tells in some 668 pages of narrative plus 180 pages of notes and appendices.* To say that he fleshes out our bare outline is a prodigious understatement. But for all its bulk, the book ends with the Soviet counteroffensive before Moscow in December 1941, leaving the Red Army to fend for itself throughout the rest of the war.

The 1918–1936 period in the growth of the Red Army is very rich in materials ranging from official regulations to reliable eyewitness descriptions. This luxuriance probably accounts for Mr. Erickson's 100 pages of notes, unfortunately located in a single glob at the end of the book. After 1936 the sources dry up, and the picture is perforce more blurred.

During and after the Great Purge, called the *Yezhovshchina* by the Russians in honor of Yezhov, Stalin's chief butcher in that period, it was felt necessary to rewrite history. Trotsky, father of the Red Army, Tukhachevsky, its greatest general, and a whole constellation of brilliant leaders became either traitors or "nonpersons" in the new history. Thus handicapped, no Soviet historian was able to come forth with a convincing story of the Red Army prior to 1936. He was short of actors to play leading roles in the drama. Even the Stalinist historian saw the asininity of having Stalin, Voroshilov, and Budenny, the only "acceptable" heroes, directing all the fronts in the Civil War. In summing up the output of Soviet military historians under the aegis of Stalin, the Western observer can only say that it was unbelievably mendacious, but unlike much second-rate fiction it was also dull.

With the exception of Trotsky, who is still the official Judas of the Revolution, the military leaders purged by Stalin are now being rehabilitated. Tukhachevsky has been lauded to the skies in the military press, and even *Ogonyok*, the Soviet counterpart of *Life* and *Look*, recently paid tribute to him.* Furthermore the Soviet military historians now have permission to point out Stalin's ineptness as a military planner and strategist, thus making it possible to discuss the disastrous first six months of the Great Fatherland War with some accuracy. It is no longer mandatory to explain the defeats as a clever Stalinist plan to suck the Nazis into a gigantic trap.

Although the Soviet military historians have been unshackled to some extent, they are still victims of restraints, both official and self-imposed, which color their output to the point that it would be unacceptable if produced by Western scholars. Students of the Soviet Union were long ago forced to adopt a double standard—they grab eagerly at a Soviet work that would never gain a publisher in the West. And this is understandable. After dealing for years with the dreary drivel of Stalin's intellectual eunuchs, they look on the present output, by contrast, as better than it really is.

Erickson's treatment of the 1918–1941 period, unlike the Soviet versions, is about as objective as anyone not from Mars could hope to achieve. He has a tremendous advantage over his Russian colleagues in many sticky areas of Soviet history. For example, the Trotsky–Stalin struggle that dominated the scene during the NEP period had its roots in the Civil War. Trotsky's fulminations against Stalin and Voroshilov because of their independent (insubordinate) activities at Tsaritsyn (later Stalingrad, and now Volgograd) in 1918 and Stalin's attempts to sabotage Trotsky's leadership during the rest of the Civil War are awkward subjects for Soviet historians. Why should the all-wise, all-seeing Lenin have backed a traitor, Trotsky, so consistently? Was Lenin that stupid? Now that

*Erickson seems to have overdone the business of source citation and scholarly apparatus, but he is sinning on the side of the angels. The frustration one feels when reading Michel Garder's *Histoire de L'Armée Soviétique*, where scarcely a reference is available, makes the calisthenics of constantly turning to the back of Erickson's book a tolerable exercise.

*On the 70th anniversary of Tukhachevsky's birth there was a rash of articles devoted to him. The following gives some idea of the *volte-face* now going on. "O Voenno-Teoreticheskom Nasledii M. N. Tukhachevskogo" (The Military-Theoretical Legacy of M. N. Tukhachevsky), *Voenno-Istoricheskiy Zhurnal*, No. 2 (February), 1963, 107-14; "Vydayushchiysya Polkovodets Sovetskoy Armii" (Outstanding Leader of the Soviet Army), *Kommunist Vooruzhennykh Sil*, No. 3 (February), 1963, 84-86; "Slavnoe Imya" (Glorious Name), *Voennye Znaniya*, No. 2 (February), 1963, 140; "Poslednie Dni Marshala" (Last Days of the Marshal), *Ogonyok*, No. 13 (March), 1963, 26-27.

Stalin is also in the doghouse, the Soviet historian is very likely to gloss over the whole business, which makes for somewhat dubious history.

This little problem of what to do with Mr. Trotsky points up one of the main difficulties in writing a history of the Red Army: the extremely close connection between political and military affairs in the Soviet Union. It also explains why Erickson subtitled his book "A Military-Political History" and devoted as much space to politics as he did to military affairs. His exhaustive treatment of the Tukhachevsky affair is a case in point. Tukhachevsky, the real brain of the Red Army in the early 1930's, was a professional officer wholly dedicated to building the best army possible, and he was very impatient with political interference. By 1934–35 he had apparently succeeded in professionalizing the officer corps of the Red Army and in reducing the political commissars to a minor role. Stalin, psychopathic in his suspicion of any group not absolutely beholden to him personally, decided to purge the officer corps of everyone even *potentially* capable of an independent line of action. In 1937 the axe fell, and most of the Red Army's best officers were eliminated. Tukhachevsky, the top man, became a symbol of this mad action.

Erickson digs deeply into this period and traces the unbelievably tortuous methods used by Stalin and his NKVD, methods that even involved "evidence" of treason concocted by the Gestapo. Soviet accounts of the Tukhachevsky affair published after the appearance of Erickson's book substantiate the accuracy of his version.

Erickson's exploration of Soviet–German military relations during the period of the Weimar Republic is the most complete to date. This trading of Russian space, in which German soldiers could be trained in weapon systems denied them by the Versailles Treaty, in return for German know-how in general staff procedures was undoubtedly beneficial to both armies. The story, difficult to unravel because both parties were determined to keep the relationship as secret as possible, is an important one, and Erickson is unstinting in his coverage of it. But then he seldom leaves you with the feeling that he ought to have explored an avenue more fully, as is often true in writings on things Soviet. As a matter of fact Erickson usually tells the general reader more than he probably wants to know and often seems to be playing the role of a "specialist's specialist."

The investigation of specific problems is Erickson at his best. His treatment of the big picture, with its political, military, and social interrelationships, tends to be so studded with details that they are confusing and the picture is not clearly delineated. For example, his account of the Civil War, admittedly a tough subject, is more bewildering than enlightening. Would that Erickson had played the "sedulous ape" to George Kennan in style and organization. The result is that the Russian Civil War still awaits its historian, or even its Bruce Catton.

Style is not Erickson's forte. His writing lacks color, smoothness, and at times even lucidity. Even intrinsically fascinating parts of the story of the growth of the Red Army become somewhat less fascinating as one plows manfully through his opaque prose. Seldom in this world, however, does one get everything, and Erickson's style seems a small price to pay for such an excellent piece of research. The book is extremely rich in new material, is as accurate as any to date, and should be saluted as a valuable addition in a field sparse even in poor works and especially lacking in such an excellent one as Mr. Erickson's. When it is compared to Soviet productions in this field, even the carping about style seems the height of ingratitude.

Aerospace Studies Institute

THE PROFILE OF VENUS

LIEUTENANT COLONEL KENNETH F. GANTZ

VENUS, the "twin planet" of Earth, swings in heavenly beauty so tightly painted with a cosmetic patina of cloud that eye at telescope has never seen her face.

The mystery of the Venusian terrain has not discouraged the imagination of the science fiction writer, who has found in it a favored abode for anthropomorphic "aliens." Nor have the like diameters, densities, masses, volumes, and escape velocities of Earth and Venus failed to inspire more serious attention to the possibility that this other world, which at times comes as close to us as 26 million miles, may be hospitable to life something like the life of flesh and blood. An oxygen-bearing atmosphere similar to our own air might well be trapped and held near the surface by a force of gravity measured as the escape velocity of 6.3 miles per second.

Conjectures among the learned about what lies under the dazzling Venusian cloudbanks have ranged "geologically" from a steaming, water-covered Cambrian world to a sunless, burning-hot sphere swept by winds of enormous force. But despite the increasing refinement of astrophysical observations the unargued facts about Venus remained few. Not until the first radar signals were bounced off the planet in 1961 was even the rate of axial rotation determined with any degree of accuracy or a physical clue found to the cast of the surface.

The nature of the Venusian atmosphere has been a particular subject of controversy. If vast oceans exist, as some maintained, then the cloud cover might be formed of water droplets. Others held that the oceans had long ago evaporated, that over the ages raging planetary gales had scoured the salt deposits and borne particles aloft to float as eternal cloud. Other theorists suggested that droplets of oil or the noxious vapors of formaldehyde mixed with water formed a soupy overcast. But certainly if free oxygen was not detectable in the atmosphere, as the consensus of scientific opinion seemed to indicate, then an Earthlike vegetation absorbing carbon dioxide and giving forth oxygen could not be presumed to exist. Of course there is no fiat that otherworldly flora or fauna be organically Earthlike. On the other hand the measured preponderance of carbon dioxide in the Venusian atmosphere must cause a "greenhouse" atmospheric ceiling that would trap solar heat at the planet's surface, raising the temperature to an estimated 615 degrees F.

The 1961 radar experiments performed by the Jet Propulsion Laboratory of the California Institute of Technology set the rotation of Venus at a very slow rate. Possibly the same face would be turned always to the sun. The dielectric constant of the surface material obtained in these experiments was close to that of sand or dust, and the scattering in the reflected waves suggested a rough terrain. Repetition of these experiments in 1962 with refined techniques gave a rotation rate of 230 Earth days (plus or minus 40 to 50 days), which is slightly longer than the 225 days the planet takes for revolution through its orbit. The surface roughness was confirmed as similar to that of the moon. Thus the roughness indicated by the scattering effect seemed contrary to the opinion of those who held that if the surface was relatively flat and the axial rotation slow, the greenhouse effect would give rise to winds blowing perhaps more than 400 miles an hour in violent dust or sand storms.

WE now have before us a brief, nontechnical, yet precisely descriptive and detailed account of the successful Mariner II probe that on 14 December 1962 gathered observational data at

a closest distance of only 21,598 miles from Venus. This profusely and clearly illustrated little book† turns first to the composition of the Mariner spacecraft system and the preparations to launch it.

After the inception of the plan only 11 months were left before the appointed firing period in the third quarter of 1962, when Venus would be approaching inferior conjunction with the earth. The Jet Propulsion Laboratory, which was charged with the project, had no time to design an entirely new spacecraft system. Existing components from early exploration vehicles and subsystems and a minimum of new equipment made up the Mariner vehicles that resulted. With its solar panels extended and its directional antenna unfolded in cruise position, the spacecraft was 11 feet 11 inches high and 16 feet 6 inches across. To conform to the capabilities of the Atlas D/Agena B launch vehicle, gross weight was held to 447 pounds. Final flight preparations were completed at Cape Canaveral during the week of 7 July 1962, and the two launch vehicles for Mariner I and Mariner II then stood ready to go.

In the night of 20 July Mariner I was lifted into position. On the second countdown the Atlas fired but had to be destroyed by the Range Safety Officer after 293 seconds of flight. By 27 August Mariner II was ready, and its Atlas was successfully fired. As the Agena second stage separated, it briefly followed a programed coasting track parallel to the local horizon. The Agena engine was then fired for 2 minutes 19 seconds to attain a predetermined velocity. Both Agena and Mariner II were now in a "parking orbit" to coast to a point favorable for injection into transfer trajectory to Venus. After 16.3 minutes of coasting in orbit Agena was fired again and entered transfer trajectory at a velocity of 7.07 miles per second, slightly above escape speed. Agena and Mariner flew on together for two minutes before the separation action, whereupon Agena performed a 140-degree yaw maneuver to forestall any possibility that the unsterilized shell might hit the planet.

Mariner II carried six scientific instruments. Four operated throughout the cruise and encounter "modes" of the flight: a magnetometer, a solar plasma detector, a cosmic dust detector, and a combined charged-particle detector and radiation counter. The infrared and microwave radiometers reported in the immediate vicinity of the planet. The monumental task of receiving, relaying, processing, and interpreting the data coming in over a period of 129 days from these instruments and the many spacecraft engineering subsystems was performed by a Space Flight Operations Center, a Communications Center, and a Central Computing Facility, backed up by five tracking stations around the world. Some 400 personnel were directly involved. During the mission the Central Computing Facility processed approximately 13.1 million data words, making more than 90 million binary bits of computer data, each a discrete unit of information intelligible to a digital computer.

Six scientific experiments were conducted: (1) to measure planetary and interplanetary magnetic fields, (2) to measure high-energy cosmic radiation and lower radiation especially near Venus, (3) to measure the flux of cosmic dust, (4) to measure the intensity of low-energy, positively charged particles from the sun, (5) to determine the temperature of the planet surface and details concerning its atmosphere, and (6) to determine the structure of the cloud layer and the temperature distributions at cloud altitudes. Two and a half months' study of the miles of data on the tapes processed by the Computing Facility gave new insight into the dynamics of the solar system and a first good look at the profile of Venus.

Two salient findings on the solar system environment during the flight have bearing on manned excursions into the interplanetary space. The experiment measuring high-energy particles indicated that cosmic radiation, both solar particles and cosmic rays from galactic space, amounted to a small fraction of the lethal dosage for an astronaut aboard during the four months of the Mariner flight. A surprising deviation was also noted from the heavy concentration of cosmic dust that has been observed near the earth, where satellites have recorded impacts at a rate of 7.5 per hour. During

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†***Mariner: Mission to Venus*, prepared for the National Aeronautics and Space Administration by the staff, Jet Propulsion Laboratory, California Institute of Technology (New York: McGraw-Hill Book Company, 1963, $1.45 paper, $3.50 hardcover), 118 pp.**

the 129 days of the Mariner reports, only one impact was encountered in deep space away from the earth or Venus.

Probably the general reader, for whom this very well-composed book has been made precisely intelligible in every statement, is most interested in the findings about Venus, the planet. These bear out the dourest of the previous conjectures and soundings. As Mariner came its closest to Venus, the microwave radiometers began to scan at wavelengths of 13.5 and 19 millimeters, the one to determine atmospheric radiation, the other radiation at deeper range near or perhaps at the surface. Three scans were made across the face of the planet: on the dark side, on the light side, and in the terminator zone. From the 18 data readings that resulted, a "fairly uniform 800 degrees F was estimated as a preliminary temperature for the entire surface." The roughness indicated by radar wave scatter would preclude an entirely molten surface, but small lakes of molten metal are possible.

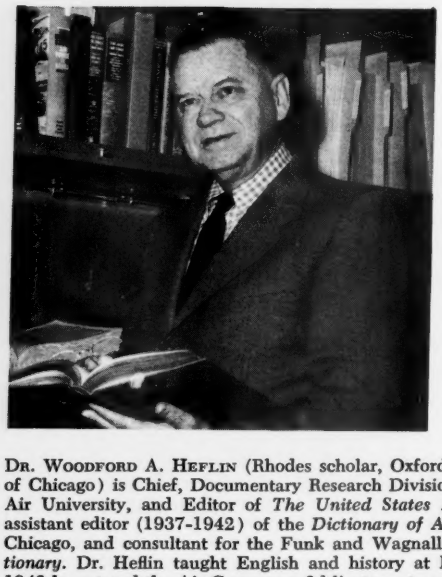
Data from the infrared radiometer indicate an unbroken cloud cover about 15 miles thick, its base 45 miles above the planetary surface. By the cloud-base temperature reading of 200 degrees F, no water vapor is likely to be present, the cloud at this level probably being formed of condensed hydrocarbons in oily suspension. Below the cloud base the atmosphere appears to be heavily charged with carbon dioxide and nitrogen, exerting a pressure at the surface of some 600 inches of mercury, about 20 times the surface atmospheric pressure on Earth. There, at the scorched Venusian ground under dense unbroken cloud above, at best some near-infrared sunlight may filter down, so that to a human eye the sky may not be pitch-black even in "day."

Altogether, the human eye would see in the fierce features behind the bright veil of Venus nothing to inspire the name of her whom the ancients addressed in varied tongues, Cytherea, Aphrodite, Venus—the dulcet Goddess of Love and Beauty.

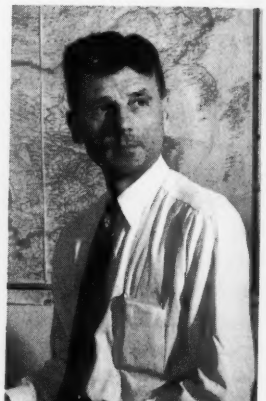
Air University Review

Contributors

GENERAL JOE WILLIAM KELLY (USMA) has been Commander, Military Air Transport Service (MATS), since 1 June 1960. General Kelly has been an active pilot since 1933. He served in a pursuit squadron, flew the U.S. mail for the Army Air Corps, and was an instructor pilot and member of the U.S. military mission to Chile prior to World War II. In the European Theater during 1943-44, he became commander of the 386th Bombardment Group (Medium), Ninth Air Force, which under his leadership was cited as the outstanding B-26 unit in the ETO for number of successful sorties, number of enemy aircraft destroyed, tonnage of bombs, and bombing accuracy. Following tours as Director of Aviation at the U.S. Military Academy and as a student and later as Chief of Plans and Operations at the Air War College, in 1948 he was assigned to the Strategic Air Command to command bomber units in the U.S. and Japan. In 1953 he was assigned to the Office of the Secretary of the Air Force as Director of Legislative Liaison. General Kelly commanded the Air Proving Ground Center, Eglin AFB, Florida, for the two years preceding his present assignment.



NORMAN PRECODA (B.S., Michigan State College; M.S., Johns Hopkins University) is with the Technical Military Planning Operation, General Electric Company, Santa Barbara, California. Before joining that company in 1953, he was for two years a scientific warfare adviser in the Office of the Secretary of Defense; earlier he was an aeronautical research scientist, Bureau of Aeronautics, Department of the Navy. Mr. Precoda's papers, covering a variety of topics, have been widely published in professional journals, and several of his articles have been required reading at the senior war colleges.



DR. WOODFORD A. HEFLIN (Rhodes scholar, Oxford University; Ph.D., University of Chicago) is Chief, Documentary Research Division, Aerospace Studies Institute, Air University, and Editor of *The United States Air Force Dictionary*. He was assistant editor (1937-1942) of the *Dictionary of American English*, University of Chicago, and consultant for the Funk and Wagnalls *New Practical Standard Dictionary*. Dr. Heflin taught English and history at Huron College, 1930-1935. In 1942 he entered the Air Corps as a 2d lieutenant, serving in the Air Training Command and then in the CBI Theater as historian. His publications include articles on Americanisms and coauthorship of "Aid to China: The Theater Air Forces in CBI" in Volume V of *The Army Air Forces in World War II*.

COLONEL ALBERT P. SIGHTS, JR. (USMA) was Director, Faculty Group C, Armed Forces Staff College, Norfolk, Virginia, before his recent assignment to the Aerospace Studies Institute, Air University. During World War II he held command and staff positions in flying and flexible gunnery training programs. Subsequent assignments have been as Inspector General, Twentieth Air Force, Guam; Chief, Personnel and Administration, Wright-Patterson AFB; Commander, Patrick AFB; and as Inspector General, Nouasseur Air Depot, Morocco. A graduate of the Armed Forces Staff College, 1950, and the Air War College, 1956, he afterward served as International Politico-Military Affairs Officer, Directorate of Plans, Hq USAF.

COLONEL LONNIE E. MARTIN, Deputy Chief of Staff, Personnel, Hq Air University, is shown being briefed on the RCA-501 Electronic Data Processing System. Commissioned in the reserve from ROTC in 1934, he entered active duty in 1940 and received a regular commission in 1946. He has served in the Pacific and European theaters in various assignments, but predominantly in personnel. In Washington he served on the War Department General Staff and later as Chief of the Policy Division, Directorate of Personnel Planning, Hq USAF. He was Director of Personnel, Third Air Force, England, prior to his present assignment in 1956.

CAPTAIN DAVID H. ZOOK, JR. (Ph.D., Ohio State University) is Associate Professor of History, U.S. Air Force Academy. From 1951 to 1953 he held psychological warfare assignments, including OIC of detachments in Korea and Japan. Following pilot training, he flew C-124's in WESTAF until his present assignment in 1959. He is author of *The Conduct of the Chaco War*, also published in Spanish by the Argentine Army's *Circulo Militar*, and of a forthcoming book on relations between Ecuador and Peru. Captain Zook is shown about to take off in a Brazilian Air Force T-22 during a visit to the Brazilian Aviation Academy.

LIEUTENANT COMMANDER ROGER J. MILLER, USN (M.S.S., University of Mississippi) is attached to the Joint Staff, CINCPAC. Commissioned in 1949 after flight training, he flew attack missions from the carriers LEYTE and BON HOMME RICHARD during the Korean War. He served as flight instructor, 1953-1955, and as assistant navigator, carrier WASP, 1955-1957. He attended the Naval Postgraduate School, then flew heavy attack aircraft in East Coast squadrons, 1958-59. After attending the Naval War College, he served on its staff until his current assignment in 1963. He has met the requirements for the master's degree in international affairs, George Washington University.

LIEUTENANT COMMANDER JAMES A. COCHRAN, USN (A.B., University of Southern California) is assigned to Patrol Squadron TWENTY-SIX. After commissioning in 1950, he served with Patrol Squadron SEVEN in the Atlantic and in Japan during the Korean War. Subsequent assignments have been as instructor, Naval Air Advanced Training Command; as student of international relations, University of Southern California; with Fleet Tactical Support Squadron ONE; as a department head aboard the USS ALBEMARLE (AV-5). After completing the Command and Staff Course of the Naval War College in 1961, he served on the staff there until his current assignment in June 1963.

DR. KENNETH R. WHITING (Ph.D., Harvard University) is a member of the Aerospace Studies Institute and of the faculty, Air University. He formerly taught Russian history at Tufts College. Dr. Whiting is the author of *The Soviet Union Today: A Concise Handbook* (1962) and of numerous studies and monographs on Russian subjects, including *Readings in Soviet Military Theory, Essays on Soviet Problems of Nationality and Industrial Management, Iron Ore Resources of the U.S.S.R.*, and *Materials on the Soviet Petroleum Industry*. He has also contributed two chapters to Asher Lee's book, *The Soviet Air Force*, and an article to Eugene Emme's book, *The Impact of Air Power*. He is a regular contributor to the *Air University Review*.

COLONEL GEORGE H. HOLLINGSWORTH (B.A., University of California at Los Angeles) is Deputy for Operations, Hq AFROTC. Upon completion of flying training in 1940, he was assigned to the 16th Pursuit Group, Albrook Field, Panama Canal Zone. He served as Operations Officer, later Deputy Commander, 326th Fighter Group, Goldsboro, North Carolina, 1943-1945; and as Assistant Wing Operations Officer, 312th Fighter Wing, Chengtu, China, 1945. Postwar assignments have been as Chief, Air Force Mission to the Republic of El Salvador, 1947; as student, Command and Staff College and Air War College, then on the Air University staff, first in Manpower and Organization, then in Plans and Policy, 1950-1958; as Executive Officer to the Commander, PACAF, 1958-1962; and as instructor, Air War College, until his present assignment in 1963.

MAJOR THOMAS D. N. DOUTHIT (M.S., Saint Louis University; M.B.A., University of Chicago) is a Program Area Coordinator for the Deputy for Technical Plans and Operations, Air Force Cambridge Research Laboratories, Office of Aerospace Research. He is also chairman of the AFCRL special working group of 16 scientists cooperating in the International Year of the Quiet Sun program. During World War II he served as a B-24 pilot with the Fifteenth Air Force in Italy. Recalled to active duty in 1951, he served in the Air Training Command for three years, then attended Saint Louis University two years under the AFIT program. With the exception of a year at the University of Chicago, he has been with AFCRL since 1956, the first five years as a Project Scientist (Geophysicist) in the Terrestrial Sciences Laboratory.

COLONEL JAMES H. WALKER (USMA; M.S., University of Michigan) is Director of Program Support under Deputy for Range Development, Hq Air Force Missile Test Center, Patrick AFB, Florida. During World War II he was a B-17 squadron commander. Subsequent assignments have been in the Office of Assistant for Guided Missiles, Hq AAF, 1946; as Chief, Air Defense Division, Hq APGC, Eglin AFB, Florida, 1953-1955; Chief, IM-99 (Bomarc) Project Office, Detachment 1, Hq ARDC, Wright-Patterson AFB, Ohio, 1955-1958; and Director of Bomarc/SAGE Tests, ASD, ARDC, Eglin AFB, 1958-1961.

DR. WAINO W. SUOJANEN (M.B.A., Harvard University; Ph.D., University of California) is Director of the Research and Development Management program of Florida State University at Eglin AFB, Florida. He has taught at the U.S. Naval Postgraduate School and the University of California. He has served as a consultant in the Office of the Secretary of Defense and in the Long Range Planning Division of the Aerojet-General Corporation and as a lecturer in the School of Logistics, Wright-Patterson AFB. During World War II he was in the Army and subsequently served as a Mobilization Designer, Office of the Comptroller of the Army. In the U.S. Air Force Reserve he holds a mobilization assignment in research and development management.

LIEUTENANT COLONEL EDMUND A. WRIGHT, JR. (USMA; M.S.E.E., Oklahoma State University) is Special Assistant to the Director, Directorate of Armament Development, Det 4 ASD, Eglin AFB, Florida. During World War II he flew 32 missions as pilot with the 3d Bombardment Group in the SWPA Theater. After the war he was assigned to Hq Fourteenth Air Force as Command Expeditor for establishment of Air Reserve Training Detachments. During 1947-48 he spoke at colleges throughout the Southeast in the interest of the USAF Officer Procurement Program. During the Korean War he was Air Liaison Officer with the 24th and 7th Infantry Divisions, and in 1951 he organized and commanded the FEAF NCO Academy at Nagoya, Japan. Subsequent assignments have been as Director of Electronics Maintenance and Supply, Hq ADC, 1952-1954; Project Officer, Titan Missile Test, AFBMD Field Office, Patrick AFB, Florida, 1956-57; Assistant Deputy Commander for Missile Tests, AFBMD, Patrick AFB, 1958-59; Chief of Bomarc Missile Systems Test, ASD, Eglin AFB, 1960-1962; and Chief, Bomarc Field Test Office, ASD, Eglin AFB, 1962-63.

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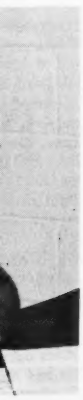

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